RESPONSES OF SOCIAL STUDIES PRESERVICE TEACHERS TO A PRESENTATIONAL SOFTWARE PACKAGE: USING THE COMPUTER TO CONTEXTUALIZE AND RECONTEXTUALIZE ACADEMIC CONTENT

BY

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RESPONSES OF SOCIAL STUDIES PRESERVICE TEACHERS TO A PRESENTATIONAL SOFTWARE PACKAGE: USING THE COMPUTER TO CONTEXTUALIZE AND RECONTEXTUALIZE ACADEMIC CONTENT

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The purpose of this study was to investigate contextualization choices of preservice teachers when they are given the opportunity to develop lessons utilizing presentation software. Twenty preservice teachers in the secondary social studies PROTEACH program at the University of Florida were the subjects for this study. Each student was enrolled in a computer class prior to student teaching in which interactive presentation software was used to create research projects. The following semester, during the student teaching experience, subjects participated in additional workshops on computer applications in education. Following student teaching, each preservice teacher was asked to develop an ideal lesson using Astound. Lessons were considered ideal because the subjects could remove the constraints associated with being an intern in another teacher's classroom.

Each episode was coded to indicate the amount of interactivity present. To this end, an interactivity measure (IM) was created. An Interactivity Measure was defined as the total number of possible interactions located within an individual episode. An interaction was defined as an instance when the computer user is given the opportunity to influence the pathway of the presentation.

The research question for this study focused on exploration of preservice teachers contextualization choices and the impact of the variables associated with student teaching. Multi-factoral ANOVA and pairwise comparisons utilizing the Shaffer-Holm procedure were used for statistical comparisons. A statistically significant difference was found between the following groups: interactive group and linear group, middle school settings and high school settings, significant modeling and both none and slight modeling, presence of a computer lab and absence of a lab, Geography and

World History, American History, and Political Science, and subject taught in lessons not matching the undergraduate major and subject taught matching undergraduate major.

During interviews, subjects indicated that their teaching style and computer usage was impacted upon by the contextualization choices of the supervising teacher. Results of this study suggest that use of middle school settings during field placements, computer modeling by supervising teachers, and integrated technology and academic preparation will increase the possibility of preservice teachers choosing to present interactive lessons in the social studies.

CHAPTER 1
INTRODUCTION

Teachers establish an environment within which students operate in the classroom. Researchers call this process contextualization (Cole, & Griffin, 1987). This study focuses on the contextualization choices made by preservice teachers when they are presenting a lesson using presentational computer software. These preservice teachers have finished their internship experiences and are given the opportunity to develop lessons that they would consider ideal, with all the constraints of the intern classroom removed. The opportunity presented to the preservice teachers allows them to develop lessons within which students can participate in active knowledge construction through an interactive discourse with understanding as the goal. The question becomes do these preservice teachers take advantage of this opportunity, and what factors impact upon their choice to do so?

Statement of the Problem

When students enter a classroom, they generally want to learn, while their teachers also generally want them to learn. If students entered the classroom as blank slates waiting to be filled, this task would be simple. However, students enter the classroom with enormous amounts of previously acquired knowledge (Gardner, 1991). If teaching is to be successful, a bridge must be developed over the gap between what teachers want to present and what students already know (Butler, & Clouse, 1994). In today's multicultural classrooms this problem becomes even more pronounced. Too often classrooms are seen as being comprised of two groups, the majority and the minority. This division, however, does not take into consideration the diverse nature of all groups in the classroom (Banks, 1994). How can a teacher develop instructional activities which serve this type of diverse classroom?

The teacher first needs to become aware of the diversity of the class, and of the issues related to this diversity. In preparing lessons, teachers need to take into consideration the audience, much as an author has to take into consideration the intended audience for an article or book (Brothers, 1990). This knowledge can be developed through external instruction or workshops (Singh, 1991), personal study (Epstein, 1993), or even through the use of technology. Technology allows a teacher to present information in a variety of ways which can be interpreted differently by different students, taking into consideration individual learning styles (Kaha, 1995). This technology, however, cannot stand on its own. It must be attached to meaningful change to be successful (Fischer, Wilmore, & Howell, 1994). The teacher, therefore, must establish an environment within which learning can take place.

Teachers select materials which will become a part of the classroom environment. For example, teachers choose the manner in which the textbook will be used in the class, as the entire curriculum, an unlimited resource, or a limited resource (Kon, 1995). Successful classroom teachers establish climates within which students can learn. This process requires that the teacher establish a context within which all students in the classroom can function successfully (Mishler, 1979). Teachers, students, administrators, and authors of texts bring their own context into the classroom. According to Cole and Griffin (1987), the teacher's responsibility is to "weave" these contexts together to form a classroom context. Computer technology provides tools teachers can use to establish this classroom context.

If students are expected to demonstrate attachment and affiliation with the class and instructional materials, how the teacher chooses to establish classroom context must be made explicit (Delpit, 1992). This requires that the teacher develop instruction which will impact each student in the classroom. A linear presentation method allows the teacher to reach some students, but does not provide for connection to all students. On the other hand, interactive instruction allows students to select their own path of learning. As Spiro and Jehng (1990) suggested:

> as content increases in complexity and ill-structuredness, increasingly greater amounts of important information are lost with linear approaches . . . computer technologies make practicable new forms of nonlinear and multidimensional learning and instruction that are better suited to conveying complex content. (p. 163)

Interactivity allows learners to become active participants in their own knowledge construction. A possible classroom scenario would involve a teacher framing an interactive lesson and students would interact in a structured manner with materials stored in a computer program. After this initial presentation, students would be given the opportunity to interact with the material individually. Students would then have the freedom to spend as much time as they desire on a learning path they have selected.

This study will examine the role of the computer as a contextualization tool. The focus of the study will be the intermediate area of learning identified by the theory of cognitive flexibility. This theory emphasizes advanced knowledge acquisition, that is, learning beyond the introductory stage, but before the acquisition of practiced expertise (Spiro, Coulson, Feltovich, & Anderson, 1988). The preservice teachers involved in this study have been exposed to introductory stage material in both technology and teaching methods. In addition, they will have had the opportunity for some practical experiences in classroom settings. After these experiences, subjects will have had similar preparation in the use of interactivity and computer technology. The focus question becomes, after practical experiences, do preservice teachers actually create presentations that are interactive? If directly approached with this question most preservice teachers will probably answer affirmatively. However, whether this answer will reflect their disposition would still be in doubt. In order for a study to be ecologically valid, following the ideas of Neisser (1976), the preservice teachers need to be studied at the level of lesson presentation. This study will explore this area.

The purpose of this study is multifaceted: (a) to explore if preservice teachers choose to incorporate interactive lessons or linear lessons using presentational software, (b) to explore whether the type of instruction of preservice teachers is influenced by the grade level of their student teaching experience, (c) to explore the influence of the presence or lack of computer modeling by their supervising teacher, (d) to explore the influence of the presence of a computer lab at their student teaching school, (e) to explore the influence of the subject matter the preservice teachers were teaching during their internship, (f) to explore the influence of whether the preservice teachers were teaching subject matter which matched their undergraduate major, and (g) to explore qualitatively the reasons behind the lesson development decisions of the subjects in this study.

Rationale

When teachers are asked for their instructional goals, many respond with the wish that their students understood what was occurring in class. Understanding becomes the focus for the classroom in this case. How can one reach a level of understanding?

A Chinese Proverb serves as an eloquent beginning for this discussion: "Tell me, and I forget. Show me, and I remember. Involve me, and I understand" (Fredericks, 1991, p. 1). Students, if they are to reach understanding, have to be able to construct knowledge. They have to be active participants in their own construction of knowledge (Gottlieb, & La Belle, 1990; NCSS, 1994). What can a teacher do to ensure that his/her students can and will be able to approach a level of understanding in the classroom? One possible answer is for the teacher to establish an atmosphere in the class where understanding can be the goal. This refers to the establishment of a classroom context. When the teacher establishes this context, it is referred to as contextualization. When the teacher modifies an established context that has already been in place, it is known as recontextualization. These ideas would constitute a call or a shift from focus on application of methods, materials, or technology, to a focus on critical evaluation of the learning environment and the learning problems associated with it (Michaels, & Bertram, 1989).

Each person that comes into a classroom brings in his or her own personal beliefs, ideas, and presuppositions. All of these will need to be combined successfully if learning is to occur habitually.

As Clifford Geertz indicated:

> man is an animal suspended in webs of significance he himself has spun. I take culture to be those webs, and the analysis of it is not an experimental science in search of law, but an interpretive one in search of meaning. . . (1973, p. 5)

Therefore, the teacher, students, administration, and even the authors of the text and other materials for the class, all bring in their own cultural "baggage." Following Geertz's ideas, classrooms should become a location for the search for meaning. The teacher controls the participation structure of the classroom. Too often, the teacher establishes what Philips (1985) referred to as a "switchboard participation structure." Students funnel everything to and from the teacher. Students are rarely given the opportunity to set direction or to ask questions. Communication generally consists of one student at a time interacting with the teacher. If students present information considered outside the line of inquiry, the teacher tends to ignore it. Students are taught in this situation to move little, utilize visual cues to decide the appropriate conduct, and control impulse behavior. Any learning becomes work to be done through competition involving individual members of the class (Boykin, 1986; Keating, & Oakes, 1988; White, 1985). To combat this idea, the teacher must establish a classroom environment where a student's own culture is safe, if not celebrated, while other cultures are valued as well. This requires that the teacher establish a "classroom context" (Cole, & Griffin, 1987).

Contextualization is important because it provides the teacher with an effective means with which to establish and maintain an academic focus. Context has been identified as a principle of effective teaching (Mursell, 1954). Researchers have pointed out, contextualization cues provide a means with which teachers can establish and maintain social order (Dorr-Bremme, 1990; Erickson, & Schultz, 1981). The teacher can therefore make the lesson more understandable to the student by appropriately utilizing context. As Bruton (1969) indicated, "the plea for proper and adequate contextualisation (sic) is based on a belief that if structures are made meaningful, they will be more firmly established" (p. 78). The lessons take on more meaning for the students when they know why they are doing something in the classroom (Noddings, 1993; Van Rooyen, 1994). This grants intentionality to the learning process. The contextualization of human intention and agency has been seen as essential to the intelligible explication of thought and activity (Franzosa, 1984). The students are therefore moving from a form of rote learning to a form of higher order thinking. This knowledge is not found, or discovered. It is actively constructed in and through discourse (Cazden, 1988; Gottlieb, & Belle, 1990). This discourse is only possible through the teacher's contextualization of the classroom. Thinking, therefore, is not something that is created solely by the teacher for the teacher, instead, it needs to be the result of social interaction among all members of the learning group (Moll, & Whitmore, 1993).

Teachers need to create an environment where students are not only able to think critically, but are encouraged and rewarded for doing so (Carr, 1988). In order to accomplish this, teachers must recognize that they are operating within their own culture, which could produce bias when combined with cultural aspects of the individual students. This will require teachers to look at their own beliefs as well as those of their students. As Patricia Nichols suggested, teachers must adopt a new perspective which requires them to accept the limitations of their own cultural perspective and develop an appreciation for different ways of understanding the world that comes from other cultures (Hornberger, 1990). If culture is left without consideration, teachers tend to magnify children's initial levels of engagement. The rich get richer and the poor get almost non-existent assistance (Skinner, & Belmont,1993). The contextualization cues mentioned previously can also be adversely affected by culture. Students can miss cues, if they do not match the cultural considerations they are accustomed to, especially if the teacher does not take the culture of the student into consideration when developing the cues (Brophy, & Good, 1986; Dorr-Bremme, 1990). If teachers are to teach effectively, recognition of the importance of student perception of teacher intent is critical (Delpit, 1992). The environment established by the teacher will impact upon the students motivation to learn. Students can develop their own dispositions according to the atmosphere and goals established by the teacher, both positively and negatively (Newby, 1991).

The teacher needs to become a facilitator of knowledge rather than a director of classroom activities (Farb-Hinitz, 1992; Fredericks, 1991; Hootstein, 1995; Selwyn, 1995). The computer can assist the teacher in this quest. The computer can allow the teacher to not be seen as a giver of information, instead the computer can become a medium through which learning can take place (Griffin, Belyaeva, Soldatova, & the Velikhov-Hamburg Collective, 1993). While functioning as a medium, the computer presents an opportunity for interaction with the student both in a classroom situation and a laboratory situation. The two most common examples of this interactive situation can be seen in examples created by the teacher and examples in purchased software. Purchased software provides examples of interactive learning from the very beginning of computer use. Most computers sold today include an interactive tutorial to demonstrate the uses of the computer, Macintosh Basics^{tm}, for example. The user interacts with a presentation at their own pace garnering whatever information can be of use to the individual. In this manner, a computer novice as well as a seasoned veteran can learn from the experience. The same type of situation is also presented by companies for classroom use.

Encyclopedias that have been developed using CD-Rom technology also illustrate interactive presentation and learning. These encyclopedias present information to the computer user at the users request in a format which is referred to as hypertext (Jacobson, & Spiro, 1995). Pictures, text, video, and other information are available upon request. The student can garner needed knowledge from the computer, no matter what the level of the student or the nature of the subject requested. It is important to note that this information is presented in a radically different mode than that used by the usual paper encyclopedia. All volumes

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are in one collection on the CD-Rom, the student does not have to search in numerous volumes. Secondly, video and sound are available which is not possible in text form. Third, direct connections to other subjects or topics, while present in paper encyclopedias, are taken to the next step on CD-Rom; at the click of the mouse the student can be looking at the connecting information, rather than beginning another hunt in another volume. Finally, the paper encyclopedia presents information in the order that the authors decided was the most appropriate. The electronic encyclopedia can present information in the order and form that the reader deems most appropriate. In practice, the electronic encyclopedia can be used to present as many different versions of information as there are users of the information.

The classroom teacher can also utilize the hypertext format developed by the electronic encyclopedia for classroom use. The same advantages would be present, and the information that would be generated would be individual in nature and actively developed. The hypertext learning environments have been demonstrated to promote superior knowledge transfer to other situations (Jacobson, & Spiro, 1995). One fear that develops in response to a hypertext learning situation is that students will not be able to effectively read linear texts after having information presented in an interactive format. When teachers present information in nonlinear methods, they provide examples of the type of thinking which can be applied in linear texts as well (Spiro, & Jehng, 1990).

A danger when this sort of idea is presented, is the assumption that merely putting computers into schools will provide a means for improving or even changing what occurs in the classrooms. It has been found that, the mere introduction of computers, or other technology, does not even guarantee that methods or goals in the classroom will change at all. Technology is simply incorporated into established school methods (Shields, 1993). If fact, researchers have indicated that some teachers who report that they have changed their teaching methods and styles, after learning about technology at in-service workshops, do not change their methods at all (Miller, & Olson, 1994).

Many believe that technology is culturally neutral. Technology has no culture; those using technology have the culture. Some would disagree with this idea. Bowers (1988) indicated that culture is inherent in technology, as culture would be inherent in a pencil if it was held by Hitler or Martin Luther King, Jr. The danger to the classroom does not come from the existence of culture in the technology, rather, the danger comes if the teacher ignores its presence and presents materials as if they were culturally neutral when in fact they are not. (Maddox, 1994). The teachers who establish a classroom context have identified their culture as well as that of their students; they need to do no less with any instructional tool including any form of technology. The establishment of a classroom utilizing the ideas of contextualization will present the students with an environment where learning can take place.

Technology allows the classroom to become a dynamic representation of the real world, rather than a static representation of what the world could be. (Adler, 1990). Students who operate inside this environment begin to develop into critical thinkers with the disposition to learn. As Oxman-Michelli (1992) has reassured, becoming a critical thinker involves both the skills and readiness, willingness, and inclination to apply those skills. Resnick supports this notion by indicating that habits of thought can be learned and therefore taught (Resnick, 1987a). Students would develop not only the ability to use skills and knowledge, but the disposition to utilize them (Katz, 1993). Teacher education programs need to recognize this factor by incorporating professional disposition as well as professional knowledge and skills in their programs of teacher education (Katz, & Raths, 1985). Moreover, preservice teachers need to develop the ability to reflect, not only on what they have done, but on what they could have or should have done as well (Hatton, & Smith, 1994). If the preservice teachers are operating from this mind set, it will be easier for them to develop similar mind sets in their future students. This develops because of the notion that

> instruction is a much more complex process when access is the goal. This type of teaching requires more knowledge and skill on the part of the teachers than is currently the norm. (Prawat, 1989, p. 34)

Students operating within such classrooms would be able to activate all aspects of their knowledge, even those which they have never utilized in school before (Gardner, 1991). Additionally, teachers can learn to present materials in ways that take advantage of the natural learning behavior of children. This has often not been a part of the previous learning experiences of students (Strommen, 1993).

The foregoing discussion points to a single position: students need to become an active part in the activity in the classroom if learning is going to become habitual for all members of a class. When students are active, all of the senses can become a part of learning, rather than merely the sense of hearing which is the focus for students in many classrooms (Eisner, 1988). If learning is to be the everyday product of the classroom and not an accidental by-product, the teacher needs to establish a safe haven for students. The students must feel safe enough to risk learning. If students know why they need to do something and feel safe enough to risk attempting it, then they will be more likely to work with their teacher. On-task behavior has been correlated with the number of relevant strategies used in the classroom (Newby, 1991). However, if students do not feel this way, then they will become nothing more than glorified stenographers. For the social studies, Eulie (1984) described this contrasting notion:

> If social studies is presented as a series of facts to be memorized, the end result will be a low-level effort to achieve that end. When, however, social studies is viewed as a series of open-ended issues, questions, and problems which have concerned humans from past to present, then the teacher infuses the content with meaning and develops pupils' abilities to imagine an infinite range of possibilities. (p. 30)

The goal of understanding is attainable. This goal only can be reached if the classroom structure allows for acquisition of a capacity for open discussion. The teacher must also develop the appropriate lesson strategies, model the processes, and provide independent opportunities for student practice (Calfree, Dunlap, &

Wat, 1994).

Need for the Study

The discussion of contextualization demonstrates the need for teachers to develop a “classroom context” within which students can operate. The technology that is available, allows teachers to connect with students in ways which were not available even a few years ago. Too often, teachers repeatedly function in the same instructional strategy, thinking that the students are operating in a comfortable environment. This does not have to be the case. No two lessons have to be identical to be successful (Caine, & Caine, 1995). Successful classrooms even venture outside “safe” use of a single method in exchange for complex and divergent coverage of a topic. Technology can provide students with the opportunity to interact with information in multiple contexts which will help to prepare them to develop knowledge, and the ability to activate that knowledge, in different ways and situations than they had experienced before (Jacobson, & Spiro, 1995). The students would be able to activate knowledge in their own manner and time, as opposed to the manner and method dictated by the teacher in a linear presentation. This clearly implies a pedagogy different from the conventional. As Fischer, Wilmore, and Howell (1994) reported:

> technology's capacity to act as a flexible composition environment, present and represent complex ideas, create multiple communication paths among teachers and students, and allow for different students to engage in different tasks simultaneously seems to fit the emergent, somewhat more than the traditional, pedagogy. (p. 127)

As Dewey (1916) indicated, education can be defined as the confrontation of problems. Interactivity provides the means to interact with problems in ways that transcend the capabilities of a linear, teacher centered, presentation. If this technology is to be used effectively in the classroom, teachers have to be aware of its uses. This would address the problem of teachers inserting new technology into existing methodologies. For technology to be a successful part of educational reform, it cannot be on its own. It needs to be part of a broad effort for school reform and considered as a set of tools to support particular forms of instruction and not a panacea for all educational woes (Means, & Olson, 1994).

The researcher chose to focus this study on preservice teachers. This was done for a variety of reasons. First, preservice teachers fit the descriptions of cognitive flexibility theory in that they have established learning beyond an introductory stage but before achievement of practiced expertise (Spiro et al., 1988). Second, if teachers are to be expected to use technology in the classroom, they have to develop a reason to do so or motivation. One way of accomplishing this is to provide successful models for the use of technology. Many practicing teachers do not want to invest the time needed to learn about technology unless they can be given a demonstration of its success. Preservice teachers can become this demonstration. If they are trained during their intern year, preservice teachers develop an increased motivation to use technology in the classroom (Williams, & Matthew, 1995). They can begin a “trickle down” of technology into the teaching practices in the schools (Johnson, & Harlow, 1993, p. 361). The teachers that practice the use of technology can spark the use of technology by others in their school. Teacher education programs also have been identified as the appropriate location to initiate a teacher’s connection with technology (Brooks, & Koop, 1989; Parker, 1993; White, 1991). The knowledge of the uses of technology needs to be developed along with the teaching methods, rather than after it. This would assist teachers looking to use technology in the classroom by providing for the development of teaching methods and technology together, rather than as separate entities. After looking at the responses of preservice teachers, it then would be appropriate to look at the responses of practicing teachers, followed by a study focusing on the impact on the performance of students in such classrooms.

Procedure

The purpose of this study was to investigate the contextualization choices of preservice teachers when they are given the opportunity to develop lessons utilizing presentational software. The program Astound was used. Twenty preservice teachers in secondary social studies from the PROTEACH program at the University of Florida were the subjects for this study. Each of these students were enrolled in a computer class prior to student teaching in which interactive presentational software, specifically Astound, were used for research projects. The subjects researched historical figures and then presented an interactive presentation defending the actions taken during the lifetime of the figures. During the student teaching experience, subjects participated in workshops on computer usage which supplemented the knowledge previously developed, and provided an opportunity to practice the use of Astound. Following student teaching, each preservice teacher was asked to develop a lesson using Astound. Each student will teach a single lesson over the number of daily episodes needed to complete the lesson material, the minimum number of episodes per student is two. The lessons will be ideal lessons, using information they have covered during their internships. The lessons are considered ideal because the subjects could remove all the constraints of the intern classroom. Time, equipment, preferred methods of the supervisor, and any other constraints could be ignored during lesson development. Each episode will be coded to indicated the amount of interactivity present. For this study, an interactivity measure (IM) will be created.

The subjects were divided into two groups accordingly, an interactive group and a linear group. The subjects were further divided into groups according to the following variables; level of the intern school (middle school or high school), computer use modeled by the supervising teacher (none, slight, or significant), availability of a computer lab at the school site, subject taught during internship (american history, world history, political science, or geography), and whether the subject taught during internship matches the undergraduate major of the subject. Each of these groups will form a factor for statistical comparison. A statistical comparison was conducted between the pairs within each factor and the factors in combination.

Following the lesson presentation, interviews were conducted with the subjects to provide a foundation for a qualitative view of their development of the lesson. A focus of the questions within these interviews was the interconnection between the topic chosen by the student and its adaptability, and accessibility to interactivity. This allows for an inspection of the thought processes of the subjects both before and during the creation of the lesson material. Would the subjects have chosen to develop an interactive lesson if a different topic was selected? This allows for a view of the qualitative differences which are available within a specific subject matter.

Hypotheses

The following hypotheses were tested:

1. There is no difference in all possible pairwise comparisons of interactivity with regard to interactivity measure (IM).

2. There is no difference in all possible pairwise

comparisons of grade level with regard to IM.

3. There is no difference in all possible pairwise comparisons of computer modeling with regard to IM.

4. There is no difference in all possible pairwise comparisons of computer lab presence with regard to IM.

5. There is no difference in all possible pairwise comparisons of subject taught with regard to IM.

6. There is no difference in all possible pairwise comparisons of subject matching undergraduate major with regard to IM.

7. There is no difference in all possible pairwise comparisons of interactivity and grade level with regard to IM.

8. There is no difference in all possible pairwise comparisons of interactivity and computer modeling with regard to IM.

9. There is no difference in all possible pairwise comparisons of interactivity and computer lab presence with regard to IM.

10. There is no difference in all possible pairwise comparisons of interactivity and subject taught with regard to IM.

11. There is no difference in all possible pairwise comparisons of interactivity and subject taught matches undergraduate major with regard to IM.

Definition of Terms

Interactivity is defined as when the computer user is given the opportunity to influence the pathway of the presentation. Interactivity may take the form of determining speed of delivery, sound, image, or film availability, and the order of presentation. If the user is simply given the opportunity to continue the presentation on a linear course, for example a button which takes the user to the next slide of a presentation, interaction has not taken place.

An Interactivity measure (IM) is the total number of possible interactions located within an individual episode using Astound.

A Lesson is the presentation of a complete topic or subject to a classroom group.

An Episode is the daily classroom presentations that make up a lesson.

Computer modeling is the amount of computer usage by supervising teacher observed by the preservice teacher. Modeling in each instance was determined by the preservice teacher's answer to the question, "Indicate the amount of computer usage modeled by your supervising teacher; none, slight, or significant."

Research in this study refers to any text, monograph, article or book produced within and refereed by a community of scholarship.

Assumptions

1. The interactivity measure will produce a sample sufficient for statistical analysis.

2. The responses of the students after lesson development are consistent with the beliefs of the subjects during lesson creation.

3. The use of ideal lessons will provide the subjects with an equal opportunity to utilize interaction, regardless of the particular internship scenario of the subject.

Limitations

1. The sample of convenience in which all subjects were members of the PROTEACH program at the University of Florida, the majority of whom had an undergraduate GPA of at least 3.0 and a GRE score of at least 1000, may have resulted in an atypical subject

population.

2. The computer backgrounds of the subjects, prior to commencement of the teacher education program, varied.

Summary

Contextualization and recontextualization have been shown in this chapter to be means through which the teacher can approach understanding as a goal for the classroom. Technology has also been shown to be one way of presenting information to students, through the use of hypertext for example, and further their quest for understanding. Finally, teacher education programs have been introduced as one place to study the uses of contextualization in the classroom. The second chapter will take each of these three areas and go into much greater detail. Research related to the construction of meaning will provide a glimpse into understanding as an educational goal and its relationship to higher order thinking in the classroom. Technology will be demonstrated to be one means of reaching that goal. Teacher education will also be presented as the most useful place to introduce technology into the field of education. Contextualization and recontextualization are just the beginning of this discussion. Only in combination with the other three major areas will the argument develop its validity.

CHAPTER 2
REVIEW OF RELATED LITERATURE

When teachers attempt to establish an academic context in the classroom, they need to have a focus for their contextualization activities. Three major components from the research literature form the backdrop for the discussion in this chapter. Research related to the construction of meaning emphasizes underlying factors which need to be understood if one is to develop appropriate contexts in the classroom. Technology, the second component, can play a role in the selection and invention of proper activities inside that context. Since teacher education programs provide an appropriate place for exploring the power of context and technology in the classroom, teacher education comprises the third component. This review will establish the context within which research findings will be discussed in Chapter Five.

Research Related to the Construction of Meaning

The term research in this situation refers to any text, monograph, article or book produced within and refereed by a community of scholarship. This would include but not be limited to educational psychology, philosophy, and reasoned curriculum theory.

When students and teachers enter the classroom at the beginning of the year, both can usually agree that they would like to have a successful year. Whether both groups define successful in the same way is a matter of interpretation. Too often, teachers see themselves as the presenters of information that students must learn. They see students as computers, whose mission it is to remember certain information exactly as presented. At a later date, they are expected to give the information that was taught back to the teacher in exactly the same format as the teacher presented it, with little or no deviation (Egan, 1992). Although this view and practice are commonplace, this mode of teaching violates our current knowledge of how students learn and develop.

The power to develop the student's mind lies ultimately in one location only, inside the student's mind. As John Dewey (1916) pointed out: "The self is not something ready-made, but something in continuous formation through choice of action" (p. 408). The student chooses a course of action; this indicates an active involvement on the part of the student. Although Dewey asserted his principle in 1916, his idea has often been revisited. The National Council for the Social Studies (1994) identified physical and mental action as one of the attributes of successful social studies. Stahl (1994) argued that each learner must act in order to assign meanings to and organize information for storage. This view of the student as actor has demanded that teachers alter their views and practices.

Teachers need to recognize that students rarely remember information verbatim. Instead, students process information imaginatively. They remember the gist of an idea and not the exact manner in which an idea is presented (Egan, 1992). The goal of teachers in this case must not be merely to instruct; teachers need to strive to educate. Going back to the Latin roots for the term, *educere*, teachers need to lead their students forward (Poole, 1995). This position is based on the belief that the children should not be left alone to discover knowledge. They need a guide who is able and willing to show them how to develop the skills that will be needed in today's society (Poole, 1995). As guides, successful teachers will develop an environment within which students can and do solve problems. Students will learn by interacting, with their peers, their teachers, and the materials, in order to solve problems placed in focus by their teachers. Their teachers also will present models of successful action along with opportunities for practice (Newman et al., 1984; Resnick, 1987b). In this environment, the goal for classroom teachers becomes higher order thinking for each of the students.

Higher Order Thinking and Its Significance

Although most people involved in education say that they can identify higher order thinking when they encounter examples of it, no single definition exists (Beyer 1985; Newmann 1991b; Resnick 1987a). Resnick described some of the factors which lead to the identification of examples, and these provide the basis for our working definition (Resnick 1987a, p. 3). Higher order thinking is a complex activity in which one applies judgment. One exerts effort. One utilizes multiple criteria in order to impose meaning on situations. In addition, higher order thinking is meta-cognitive, involves the quest for items which might not be known, and can be non-algorithmic. Because higher order thinking refers to the prudent and persistent use of skills and standards in a variety of situations, the concept resists definition but not conceptualization.

Teachers instruct their students. In order to represent their discipline, field, and tradition successfully, they establish conditions of cognitive and emotional apprenticeship for their students. They then proceed to coach the academic performances of their students as they conduct lessons (Collins, Brown, & Newman, 1989). It is in this dimension of teaching that many of the process-product variables, such as teacher structuring and wait-time, have been correlated with student achievement as well as with process variables (Bellack, 1966; Rowe, 1986).

Although process-product skills have been correlated with important learning outcomes in naturalistic settings and although they may be acquired in simulated settings, such as microteaching, teachers have often refused to accept that such skills must be employed functionally and prudently if they are to function in instructional contexts (Rosenshine, 1986; Rosenshine, & Stevens, 1986). If the findings of naturalistic studies are to be tapped for purposes of teacher education, then novice teachers must acquire the ability, disposition, and wisdom to use these findings functionally in a variety of instructional contexts (Neisser, 1991). For example, teachers should be able to realize the need to identify skills and the need for their use for certain groups of students. Weinstein and Mayer (1986) have argued that weaker students will find the identification of skills and their uses more useful than ordinary presentations. Stronger students posses the ability to activate their knowledge for their own reasons, while the weaker students will need to be shown how to do so. So long as teachers fail to instruct skillfully and functionally, their credibility as cognitive coaches will decline (McNeil, 1986). As their credibility declines, the risk of engaging with challenging tasks without the benefit of skilled guidance will lead students to avoid such work (Skemp, 1979).

Although teachers seldom commit their plans to paper, they do prepare themselves to teach (Clark, & Patterson, 1986). Experienced teachers develop cognitive maps, as well as scripts, that guide their behaviors from grading period to grading period and year to year. Their behavior tends to be highly reliable and predictable (Berliner, 1986). Disciplines, such as history, and fields such as the social sciences provide teachers with expert modes of perception, conceptualization, and interpretation which may be applied in order to understand significant actions, events, issues, movements, problems, texts, and other phenomena (Carr, 1961). Such expert modes of perception, conceptualization, and interpretation differs from the common sense modes children acquire as a consequence of socialization in their culture, society, and group (Berliner, 1988; Glaser, 1987). Unfortunately, these expert modes of perception, conceptualization, and interpretation contradict the modes of perception, conceptualization, and interpretation which are emphasized during schooling (Gardner, 1991). If disciplines and fields are to be taught, teachers must acquire the ability and disposition to transform conceptual knowledge acquired from a variety of sources into learning activities for their students (Shulman, 1987). These activities in turn, have long evoked higher order thinking.

In the language of Vygotsky (1962), the learning tasks teachers invent and design for their students must be proximate, meaning that they challenge students to exercise their abilities but are feasible with the assistance of an expert coach. In the language of Resnick (1987a), these proximate-zone tasks should demand the application of higher-order thinking skills for all students of all grade levels. By transforming their knowledge of their discipline into higher order proximate-zone tasks, teachers establish the academic contexts within which they may coach students (Resnick, 1989). As Resnick (1987a) has argued, social studies students would gradually grow in their ability and disposition to read and respond to texts worthy of being read, to construct written and graphical texts worthy of criticism and discussion, and to participate in debates, formal or informal, worthy of intersuasive engagement.

If teachers determine that they will employ proximate-zone tasks which promise to provoke the deployment of higher-order thinking skills, then they must confront several problems. Teachers must decide whether to select a few topics to be studied with sufficient depth for higher order thinking to be promoted or to cover as many topics as possible in a school year (Newmann, 1991b; Newmann, 1988). They must commit themselves to teaching in a less predictable environment than that demanded of teachers who settle for fragmentation, bracketing, mystification, and defensive teaching (McNeil, 1986; Resnick, 1987b). They must act in a timely and assertive manner if they are to establish and maintain an academic environment, an environment in which they are free to teach academically and their students are free to student academically

(Charles, 1992; Emmer, Evertson, Sanford, Clements, & Worsham,1989). In order to emphasize higher order thinking, teachers must overcome the powerful dynamics of classroom negotiation and bargaining (Sedlack, Wheeler, Pullin, & Cusick, 1986). Finally, they must violate conventional norms and patterns of behavior.

When teachers violate conventional practice, they can begin to employ appropriate and attractive activities which evoke higher order thinking skills. Furthermore, as teachers control the invention and sequencing of activities, they become more able to consider the cultural component brought into the classroom by the students. The world view, or organization of the world, which students bring to the classroom differs from the world view of the teacher as well as that of the authors of the instructional materials (Cobern, 1991). “In order to teach you I must know you,” it has been argued (Delpit, 1992, p. 249). Teachers must employ instructional strategies in order to include students in the classroom quest for thoughtfulness. For example African-American males do not respond to competitive environments as well as they do to more cooperative, interactive environments (Wiggins, 1993). When teachers do not choose to invest time and energy in the quest for more information about their students, they can begin to target lessons at their perceived level of the students. In these cases, remediation replaces understanding as a classroom goal. The students do not learn how to learn because no one has shown them what learning should be or how to do it properly (Delpit, 1992).

In order to provide the best instructional environment for each student, teachers need to attend to the student's needs. This attention can focus on projected outcomes, learning styles, and information processing requirements of the individual student (Kaha, 1995; Stahl, 1994). After identifying students learning requirements, teachers need to develop congruent course materials and activities. When congruent materials and activities are employed, teachers tend to empower students (Banks, 1994).

Higher Order Thinking in the Social Sciences

Higher order thinking has been a major topic of discussion in all teaching fields for many years, the social studies is no exception. Joseph Onosko (1991, p. 341) used some provocative quotations to open his discussion of higher order thinking in the social studies:

> There is no use in claiming to teach boys and girls how to study,and how to command their intellectual forces by the current practice of keeping them at the point of the bayonet in rehearsal of textbook facts. . . (Stevens, 1912, p. 26)
>
> The chief purpose of this analysis . . . was to get some evidence bearing on the growth of pupils in understanding. From this point of view the study was not successful for the simple reason that. . .the pupils did not talk enough to give any evidence of mental development. (Corey, 1940, p.745)
>
> The dominant modes of instruction continue to be a large group, teacher controlled recitation and lecture, based primarily on the textbook. (Shaver, Davis, & Helburn, 1979, p. 151)
>
> Most discussion in classrooms, when it occurs, calls for simple recall. . . serious intellectual discussion is rare. . . how can the relatively passive and docile roles of students prepare them to participate as informed, active, and questioning citizens? (Boyer, 1983 pp. 146-147)

Beyer (1985) opened a special issue to *Social Education* by quoting Anderson (1941):

> Social studies teachers have long accepted critical thinking as an important and desirable outcome of instruction. Or perhaps it would be more accurate to say that... they have accepted critical thinking in principle without bothering to define the term precisely or to do much by way of direct instruction to see that this goal is achieved. (p. v)

As these quotations document, the idea of higher order thinking in the social studies is not a new one. It has been urged for more than 60 years. Trimble (1986) identified eight studies from 1947-1967 which connected citizenship education and the teaching of higher order thinking skills. During these years, critical thinking gained the support of many politicians and civic groups. "Institutes of critical thinking sponsored by school districts, professional organizations, and consultant firms abounded throughout the nation" (Trimble, 1986, p. 6). However, this emphasis on higher order thinking did not prevent many students from continuing to graduate from high school without the ability to think critically or to reason persuasively. Why? Beyer (1985) identified two reasons. First, the nature of thinking has never been clearly delineated. Secondly, neither texts nor teachers truly develop the skills associated with higher order thinking through exposure and guided practice. Beyer (1985) proposed that social studies teachers emphasize the following: "determining the authenticity, accuracy and worth of information and knowledge" (p. 276).

In the same issue of *Social Education*, Hunkins (1985) proposed the use of a questioning style through which the students would acquired a strategy as well as information. Hunkins believed "teachers should play the role of consultant and clarify anything that is unclear to the students" (Hunkins, 1985, p. 296). Batcheller ended the special issue with a call for more funding for a curriculum program for social studies K-12. He believed money was necessary in order to involve the entire staff in the proposal of a solution (Batcheller, 1985). The theme of the entire issue was change, not in some classes, but in entire schools. As time went on, social studies educators continued to press for higher order thinking. Most authors urged teachers to forgo repetition, and to strive for more thought and reflection (Wilen, & White, 1991). As one reads the literature, one does not sense that the rhetoric found in social studies literature has progressed or been attuned to developments in related fields such as educational psychology, moral philosophy, and technology.

This problem finally lead the editors of *Theory and Research in Social Education*, to devote an issue to the problem. Fred Newmann and his associates at the University of Wisconsin attempted to answer two major questions: the extent to which it is possible to encourage higher order thinking in social studies classrooms, and the barriers to successful programs (Newmann, 1991b). In order to answer the first question, Newmann and his colleagues developed a criteria according to which thoughtful classrooms might be identified. Newmann's criteria provides teachers with standards which they might apply to their own classroom.

Newmann (1991b) stressed five attributes of thoughtfulness. Unless these five conditions are met, then the classroom cannot be a thoughtful place where higher order thinking is practiced. First, the sustained examination of a few topics rather than superficial coverage of many, provides students with the opportunity to study topics in depth.

Second, the teacher presents lessons characterized by the teacher's need to display coherence and continuity. Students must process information in an orderly and planned manner if they are to construct and test meanings.

Third, students are given appropriate time to think and prepare responses. Following the ideas of wait-time put forward by Rowe (1986). Students need time to develop responses. If a teacher moves too quickly, many students will be unable to develop reasonable responses.

Fourth, the teacher asks challenging questions or structures challenging tasks for the students. If students are not challenged, they will not employ their potential. The tasks presented must be proximate, i.e., within their ability to perform with assistance (Vygotsky, 1962).

Five, the teacher needs to be a model of thoughtfulness. It is not enough for teachers to present the ideas to the students. The teacher must demonstrate through their behavior the techniques predispositions associated with thoughtfulness (Newmann, 1991b).

Newman and his colleagues identified the following barriers to the development of a thoughtful classroom: inadequate planning time, large classes, extensive content coverage, and the lack of a model or image of productive thinking on the part of teachers (Onosko, 1991). The teacher may state that the goal of the classroom is understanding, however, if the teacher does not posses a mental image of what understanding might be, a thoughtful classroom cannot adequately function. This can lead the teacher to recognize different responses as being thoughtful, with varying criteria. This could lead the teacher open to utilizing personal misconception or bias as a criteria for defining thoughtfulness, for instance equating thoughtfulness with a particular cultural group or the use of a particular resource (Delpit, 1992).

If teachers cannot envision thoughtfulness in their own mind, how can they expect their students to do so? The discrepancy in the models employed by teachers can be seen in what teachers bring into the classroom to supplement the textbook. Teachers who brought in outside information to supplement everyday class information were more successful in promoting thoughtfulness, while teachers who failed to do so where not as successful (Onosko, 1991).

In common with social studies educators who had preceded them, Newmann and his colleagues concluded by urging teachers to emphasize higher order thinking in order to develop the abilities of their students, especially those associated with practicing social criticism (Newmann, 1991b). Interactive technology could provide social studies educators and teachers with a powerful means for pursuing the goal of higher order thinking. Technology begs to be used in association with such related purposes as higher order thinking (Merrill, Hammons, Vincent, Reynolds, Christensen, & Tolman, 1996). Technology has been demonstrated repeatedly over time, and in different formats to have a positive impact on the motivation and/or disposition of the student to learn materials, if the technology is presented relevantly (Robertson, 1978; Olivier, & Shapiro, 1993; Schumk, 1990; Zimmerman, 1989).

Students and Teachers Dispositions

Student engagement with academic and higher order tasks has become a major locus of educational rhetoric. Education is one of those professions where success depends on clients investing themselves fully (Newmann, 1991a). If students cannot see the relevance of materials, activities, or any artifact of the classroom, teachers should not be surprised when students fail to pay attention (Eulie, 1984; Noddings, 1993; Wilson, & Marsh, 1995). To provide the best instructional environment for each student, the teacher needs to pay attention to the needs of students, in terms of projected outcomes, as well as their individual learning styles (Kaha, 1995; Stahl, 1994). Teacher's use of strategies, relevant to the subject being studied as well as the individual students learning styles, has been positively correlated with on-task behavior (Newby, 1991). In order to reach a majority of students, teachers need to design relevant tasks, model appropriate behaviors and share their own convictions when it comes to understanding the material (Gibbs, & Early, 1994). While engaged in the process of creating lessons, teachers need to be aware of the influence of their own culture as well as the impact of their lessons on the cultures of students

(Barnitz, 1994). The typical classroom activities which may be successful for some students will not be effective in anyway for others. African-American males for example, have been demonstrated to work better in cooperative group settings than they do in individualistic settings (Heath, 1989).

Teachers need to know their students and they need to respect the cultural baggage and prior experiences they bring to the classroom. In order to understand the diverse nature of the students, teachers, both preservice and in-service, must be open to classes in multicultural education. Even a small number of classes will enable the teacher to begin to recognize when cultural issues arise in the classroom (Messner, 1993).

Teaching diverse learners will require teachers that break with convention. If groups of students are not able to learn through conventional means, teachers must find a way to teach them to learn in a new manner which is appropriate for them (Dunn, 1995). Teachers can use a variety of means to gather information about their students. This includes the use of reflective journals. The journals allows both teacher and student to realize what they know and what they do not know concerning the academic material (Bagely, & Gallenberger, 1992).

Giving students certain tidbits of information cannot be the goal of the classroom teacher; instead the goal for teachers must be to provide all students, no matter their cultural background, with the higher order thinking skills, along with the willingness and inclination to apply those skills (Oxman-Michelli, 1990; Resnick, 1987a). Teachers once again need to rethink their role in the classroom, moving from images of themselves as information providers to images of themselves as facilitators of learning (Cole, & Griffin, 1987). With this shift accomplished, teachers will be more inclined to allow students to become move actively involved.

Students will be influenced by the modeling behaviors of their teachers. In classrooms where the teacher and the teacher's interpretation of materials are seen as authoritative, many students will determine that interpretive responses and higher order thinking have no place. On the other hand, in classes where students are lead to see that alternative viewpoints to the text and teacher are allowed, questions posed by students might become a major source for discussion and higher order thinking (Miller, 1990).

Discussion in the classroom can be a powerful tool; however, it can be seen as being dangerous as well. Discussion is seen as being taboo in many schools because many see it as leading towards indoctrination (Noddings, 1993). The students involved in the discussion are repeating ideas expressed by the teacher instead of practicing critical interpretation of questions. When students are involved in a task labeled as discussion and are following a prescribed path developed by the teacher with no area available for student input and opinions, indoctrination can be the result. Indoctrination disguised as discussion has to be avoided by educators (Young, 1990). Discussion in the classroom needs to allow students to see the value of stating their opinions, within the context of academic discourse.

The need for more active student involvement has begun to filter into discussions in education.

> Changing teacher behaviors from those that undermine to those that promote engagement of discouraged children, should be a top priority of educational reform. (Skinner, & Belmont, 1993, p. 580)

Students want to be involved with learning. Unfortunately, many students have been discouraged in the classroom to such an extent that they refuse to participate further in activities. Teachers need to work towards new areas of student involvement. Too often, teachers have seen how schools have reacted to new ideas, such as technology, attacking them as if the new ideas were viruses attacking the body (Papert, 1993). Such reactions prevent "advanced" ideas from being shared. They are employed in secret, behind close doors for fear of repercussions (Houser, 1995). Teachers should be encouraged to be innovative and to discard conventional practices and beliefs which have been found to be incongruent with informed opinions in the research traditions within their teaching fields. Teachers need to establish their own dispositions early during training, while working constantly towards improving the disposition of their students (Katz, & Raths, 1985).

In order to be successful, teachers must engage with their students and the subject matter. They must develop the disposition to work towards learning in the classroom. Katz (1993) has argued as follows:

> 1. Acquisition of skills and knowledge does not guarantee that they will be used and applied.
> 2. Instructional processes by which some knowledge skills are acquired may themselves damage or undermine the disposition to use them.
> 3. Teachers need to support desirable dispositions and weaken undesirable dispositions.
> 4. There is an optimum amount of positive feedback above which students may be preoccupied with performance and the judgment of others and not involved in the task.
> 5. Dispositions are less likely to be acquired through didactic processes then to be modeled by young children through exposure to people who exhibit them.

Katz's argument reinforces that it is important for teachers to think of students as active participants in their own learning. Students need to invest in their own learning if they are to be successful. Students need to be shown what to do and how to do it. They also need sufficient amounts of time to practice it (Calfree et al., 1994). This type of classroom will require investment of effort on the part of both teachers and students. Higher order thinking requires effort (Resnick, & Klopfer, 1989). Students play hard all the time with items they enjoy. Teachers need to harness this energy and show the students that hard work in the classroom can be equally rewarding (Noddings, 1993).

Views of Thinking and Learning

How do students learn? This has been a topic of conversation in many areas of the world for many years. With the advent of the computer age, many started to equate children's thinking with the working of a computer. Students listen to information presented in the class, store it, and retrieve the exact information at some future occasion. Kieran Egan (1992) disagreed with this analysis. Instead he chose to focus on students utilization of imagination in learning. Children do not remember information verbatim, like a computer, instead students remember the “gist” of information while the particulars change (Egan, 1992). In the same manner, children process information imaginatively outside of school. For example, they apply significant amounts of effort in order to acquire the information necessary to ride a bike, throw a ball, or play a game. If they were shown how to use the same learning processes in school, they might start to like to learn in school as much as they like to learn outside of school. This also would allow the students to connect information learned both in the school context and the out of school context (Gardner, 1991). Additionally, teachers would be working with their students in areas students might never consider on their own.

If Egan’s approach were followed, students would work in what Vygotsky (1962) referred to as the zone of proximal development. Ideally, students would stretch their abilities by working in areas they could not have reached alone. However, Vygotsky’s ideas have been interpreted differently in many American classrooms. “English speaking scholars interpret the concept more narrowly than Vygotsky intended...” (Moll, & Whitmore, 1993, p. 19). The social aspect of the zone of proximal development is what has been missing in many classrooms. Students are being challenged, but individually, in a competitive environment, which runs contrary to the ideas of Vygotsky. Instead, students should be assessed on what they can do in collaboration, rather than what they can accomplish in isolation. This leads to a pattern of study which "lags behind the children's development, so we characterized the history of the child, failing to capture the ongoing process or to provide future development" (Griffin et al., 1993, p. 124). Strommen (1993) found that more correct answers came out of cooperative environments than competitive environments and that the only effective strategies for problem solving were located in cooperative environments.

This leads to the principle of activated knowledge. Students often possess knowledge which they have acquired, but that they cannot access as needed. Bransford, Franks, Vye, and Sherwood (1989) referred to this as inert knowledge. Students may have been able to correctly answer a question on a test, but when presented with realistic contexts, students could not activate it. Howard Gardner (1991) illustrated this idea when he compared what questions students could answer in school contexts and in out-of-school contexts. Gardner found that students could activate far less school information out of school then they could while they were in school. Having information does not suffice, students have to know what to do with the information that is collected.

Resnick (1987a) indicates "much of learning to be a good thinker is learning to recognize and even search for opportunities to apply one's mental abilities" (p. 41). Teachers cannot settle for merely showing information to students, they must help students develop the means to use that information both inside and outside of the classroom. Teachers as well as students, learn not only what they are taught, but more importantly, how they are taught (Haipt, 1994). This serves as a reminder to teachers that the old saying is true, "actions speak louder than words."

Instead of seeing students as absorbing the introduction of an official curriculum or teaching plan, teachers must help students to see the meaning of the new information. The meaning will form a link between information and understanding (Caine, & Caine, 1995). This link will assist in meta-cognitive activities that students will be able to perform. Research into thinking systems has provided a view that we have to focus simultaneously on general meta-cognitive processes of problem-solving and organized knowledge structures which provide the conceptual tools for thinking (Johnson, 1993). One such tool available for the classroom exists in the form of journals. Journals can provide students with the ability to recognize what they know and what they do not know. Journals also provide teachers with similar information so that teaching strategies can be tailored to benefit specific areas of need which are identified (Bagely, & Gallenberger, 1992). Through the development of meta-cognitive processes, students accept accountability for their actions, another step in academic attachment (Wehlage, Rutter, Smith, Lesio, & Fernandez, 1989).

The development of students' meta-cognitive opportunities must be accompanied by the development of discourse. Students must have opportunities to develop academic discourse, that is both linguistic and cultural knowledge about what it means to be a member of a particular community, for instance a classroom, in order to achieve academic competence (Gutierre, 1995). Students need to use discourse in school; however, school discourse is qualitatively different from everyday discourse because "words are not only used as a means of communication, but as an object of study as well" (Moll, & Whitmore, 1993, p. 20). For example, the ability to participate in moral and civic discourse has long been a major goal of social scientists.

A Model of Critical Discourse

Educators are looking for means to lead their students forward towards knowledge. This necessitates a shift in the goal of education, away from accepted convention. As Mollenhauer suggested: “The goal of education lies in the establishment of a communication structure in the classroom which makes the acquisition of a capacity for a free and open discussion possible” (Young, 1990, p. 59). The goal of education shifts to the components of free and open discussion, speech acts.

Jurgen Habermas focused his work on speech acts. For Habermas, all speech acts are an offer, and we can “accept the speech act offer or decline it” (Habermas, 1984, p. 297). For discourse to be successful, it must be guided by standards. Habermas generated standards by developing the ideal speech situation or ISS. The idea behind the ISS is a critical reconstruction of the assumptions of communication in everyday speech. These assumptions are:

> i. that what we are saying or hearing is intelligible, i.e. is coded according to the usual rules
>
> ii. that what we are saying or hearing is true in so far as it implies the existence of states of affairs, etc.

> iii. that the persons speaking are being truthful or sincere.
>
> iv. and that the things said are normatively appropriate considering the relationships among the people and between them and the situation they are in. (Young, 1990, p. 76)

These assumptions may be counter-factual, but without them there would be chaos. The speech characterized by these assumptions is identified by Habermas as having the form of the sphere of human action, as opposed to the goal oriented manipulative action he would identify as "strategic action" (Young, 1990). An ISS is also a discourse in which no external constraints prevent participants from equal access to the discourse and the products of the discourse (Giddens, 1985). Habermas goes even further by indicating four conditions that need to be present for discourse and ISS to be achieved. First, all participants must be given the same chance to openly address, question, and reply in speech acts. Second, all participants must have the same chance to issue interpretations, recommendations, explanations, justifications, and claims of validity. Third, only active subjects, those that can express their views, feelings, and wishes, may participate. Participation will make their internal reasoning for doing so transparent to all involved. Finally, the discourse allows only for speakers that have an even chance to employ regulated speech acts in a completely reciprocal environment, thus excluding all one-sided binding behavioral and evaluative norms. The speech act should not be bound by constraints which limit free expression (Horster, 1992).

It is important to think of the ISS as a tool and not as a measure. According to Habermas, it can be usefully applied to face to face communication, rather than to large scale communication structures (Young, 1990). The ISS can provide a general view of the health of communication (Giddens, 1985; Horster, 1992; Young, 1990). According to Habermas, communication can provide those involved in the discourse the means to actively participate within the environment established. All participants adding to the discourse as a whole (Horster, 1992). Communicative action can be seen as an useful image of what can occur in the classroom, but is that idea true for all classrooms?

Robert Young indicated that educators are faced with a dilemma, a double task. They must prepare children to take their place in a society that already exists, while at the same time, it is recognized that the society which exits is only an imperfect representation of what it could be (Young, 1990). In other words, teachers are preparing students to take their place in a society, but the society teachers use as a goal only existed in the past or did not exist at all. Young, as well as Habermas it is assumed, would define what is occurring today as a crisis. "The present struggle is about the moral foundations of education, about its relation to the freedom of the individual and the purpose of the state" (Young, 1990, p. 3). The pattern of crisis in education, from the clashes in the 1960's to the reform efforts of the 1980's, are well defined by Habermas' work Legitimation Crisis (1976).

As an economic crisis develops in society, people look towards the government and the experts for help. As the people realize that explanations and solutions are not coming, they recognize that both are as helpless as they are. People then begin to question the legitimacy of government and call for the government to retreat out of people's lives. This constitutes a crisis of motivation and meaning (Habermas, 1976). In today's educational crisis, this can be applied directly to the young people. As they lose confidence in the fact that working hard in school will lead them to a good job after school, they lose the motivation to work in school at all. "In turn jobs are reduced to incomes and the idea of 'vocation' disappears" (Young, 1990, p. 4). Educators must walk a fine line. For Habermas, there is a relationship between the "enterprise of knowledge at the university level and democratic form of decision-making." (Young, 1990, p. 63). Developing in their students the ability to critique, teachers must establish the necessary protections against indoctrination. If the aim of education is to create students who are capable of thinking for themselves, then educators must work in such a manner as to make themselves virtually unnecessary (Young, 1990, p. 60).

Most students feel more comfortable in an environment were they feel safe; however, they must also be in an environment where they are pushed to become active participants in the discourse which is taking place. The basic question can be; do we want students who are participants in the classroom, or do we want stenographers who take down words of the teacher and repeat them back on tests? If the answer is the former, a classroom context for questioning must be established, and the proper questions must be asked. As put by Prawat (1989):

> In short, it involves thinking of the child as a total cognitive being, one who, when empowered, has access to a free range of intellectual resources and thus can respond, productively as opposed to reactively in various in-school and out-of-school contexts. (p. 38)

These words support the ideas proposed in the literature thus far, that students should be an active participant in the discourse through which they can practice higher order thinking.

Can the classroom be considered an example of an ISS? If schooling is thought of as something that is imposed upon students, the students will not have the motivation to strive for higher order thinking (Corrigan, 1987). If, however, social studies teachers were to model the prescriptions discussed in this section, they might generate higher order thinking in the classroom. The students would be given the opportunity to practice everyday communicative practices critically (Cooke, 1994). Teachers can employ questions and generate discourse. When the discourse fits the guidelines established by Habermas, students can be given a reason and an opportunity to participate in knowledge construction.

Cognitive Flexibility Theory

Cognitive flexibility theory is a constructivist theory, building upon the ideas developed by constructivist scholars. Cognitive flexibility theory adds a new element to constructivism, the flexible use of preexisting knowledge (Spiro, Feltovich, Jacobson, & Coulson, 1992). This idea can be seen as being doubly constructive. First, understandings are constructed using prior knowledge to go beyond the information given. Secondly, the prior knowledge itself is constructed, rather than retrieved intact from memory on a case by case basis (Spiro, Feltovich, Jacobson, & Coulson, 1991a).

Critical to the idea of cognitive flexibility theory are multiple representations of material. Any material should be covered from a number of differing perspectives. For example, a study of the American Civil War should include the thoughts and opinions of Northerners, Southerners, slaves, farmers, politicians, and any other groups which were represented in that particular place and time; "Single representations are not false, they are inadequate" (Spiro, Feltovich, Jacobson, & Coulson, 1991b, p. 22). Any single representation will miss important ideas that could be of use (Spiro et al., 1991a). While a single representation might delineate important issues and facts about an event, clearly the lack of other representations would leave the issue slighted. The idea of cognitive flexibility consists of visiting information from many different points of view, instead of merely a single perspective. The idea is similar to those of Egan (1979), whose Ironic stage, the last in educational development, is characterized by the challenging of models of thought by examination from various perspectives. As indicated by Jacobson and Spiro (1995):

> CFT (cognitive flexibility theory) suggests that a rich and flexible understanding of a complex conceptual landscape will emerge only after the learner has made numerous traversals of the domain from different intellectual perspectives. (p. 303)

Without multiple representations, students are able to perform well on measures of "factual knowledge," but these same students suffer in terms of knowledge transfer for later use (Jacobson, & Spiro, 1993). The single representation notion leads to a comparison of linear and nonlinear presentations in the classrooms.

Spiro (1988) and his colleagues (Spiro et al., 1987) demonstrated that doctors taught in a linear progression had trouble recognizing diagnoses in ambiguous situations presented in medical practice. While serving as students, these doctors could recite information successfully for grades, but when placed in a "real life" setting, or ecologically valid setting (Neisser, 1976), the same students failed to make proper diagnosis. The same could be said for teachers in the classroom. If a teacher is asked to develop a paragraph of explanation about a specific text, most could do so with no problem. However, many teachers might have a problem with developing the same assignments for their students. Teachers may know how to create knowledge themselves, but lack the ability to provide students with the same opportunity (Spiro et al., 1992).

Cognitive flexibility theory focuses on three levels of knowledge development, introductory learning, advanced knowledge acquisition, and practiced expertise (Spiro et al., 1988). Introductory learning can be defined as exposure to content and the establishment of a general orientation (Spiro, Vispoel, Schmitz, Samarapungauan, & Boerger, 1987). Advanced knowledge acquisition can be defined as attaining a deeper understanding of content material, reasoning with it, and applying it flexibly in diverse contexts (Spiro et al., 1988). Practiced expertise can be defined as movement beyond advanced knowledge acquisition developed through continued and varied practice (Spiro et al., 1987). Of the three levels, most researchers in the area of cognitive flexibility theory have stressed advanced knowledge acquisition (Jacobson, & Spiro, 1994; Spiro et al., 1992; Spiro et al., 1991b; Spiro, & Jehng, 1990). The major difference between advanced knowledge and expertise is the experience and wisdom developed through practice. In education, a similar idea has been developed in the work of Berliner (1988). He found that teachers need of a period of time in order to develop expertise.

Spiro and his colleagues (1988) identified seven conditions that needed to be present in order for cognitive flexibility to function. These included:

> 1. Avoidance of oversimplification and overregularization.
> 2. Multiple representations of a topic
> 3. Centrality of cases, decisions have to be made during instruction they cannot be prescribed in advance.
> 4. Conceptual knowledge is knowledge in use.
> 5. Schema Assembly must shift from retrieval of preconceived knowledge structures to assembly of knowledge from different conceptual sources.
> 6. Non-compartmentalization of concepts and cases, which reflects multiple interconnectedness.
> 7. Active participation, tutorial guidance, and assignment support from the management of complexity. (Spiro et al., 1988, p. 376)

The ideas presented are similar to those associated with anchored instruction. Students are able to explore complex problems which are situated in the instruction. The students explore these problems over a period of time and from many perspectives (Bransford, Sherwood, Hasselbring, Kinzer, & Williams, 1990; Savery, & Duffy, 1995). In classroom situations, students must be given a reason to pay attention. If they are going to invest effort into a classroom project, they must see the relevance for it, to both themselves and the class as a whole (Butler, & Clouse, 1994; Merrill et al., 1996).

When information presented to students follows the prescriptions outlined above, students are given opportunities to strive towards higher order thinking on a regular basis.

Spiro and his associates employed the computer and other technological means in order to address the problems emphasized in cognitive flexibility theory (Jacobson, & Spiro, 1993; Spiro et al., 1991a; Spiro et al., 1991b; Spiro, & Jacobson, 1995; Spiro, & Jehng, 1990). Computer environments have allowed them to demonstrate explicitly critical interrelationships between abstract and case specific knowledge in multiple contexts. This has enabled students to use knowledge in new ways and settings (Spiro, & Jacobson, 1995). Such instruction has tended to reduce the compartmentalization of information between settings, a problem that has been identified by Gardner as well (1991). Spiro and his associates have determined that the computer provides a means for students to crisscross the landscape of knowledge from the different perspectives identified by cognitive flexibility theory (Spiro et al., 1991a). Students can read texts via computer and proceed through the information at their pace and in their own order. Computer technology provided a means for instruction to move past linear, teacher centered ideas to more interactive notions. Spiro and

Jehng (1990) concluded:

> The advent of random access computer technologies makes practicable new forms of nonlinear and multidimensional learning and instruction that are better suited to conveying complex content. (p. 163)

The computer makes possible lessons and methods of presentation that cannot be considered in traditional classrooms using only textbooks, chalk, and overhead projectors (Spiro et al.,1992). While traditional methods have been demonstrated to be successful for many in terms of memory of factual information, Jacobson and Spiro (1993) have demonstrated that the use of computers, following the tenets of cognitive flexibility theory, can lead to superior knowledge transfer than traditional instructional methods.

An important warning must also accompany the ideas of cognitive flexibility theory for computer usage. The ideas are not a panacea that can simply be introduced into any classroom. The classroom teacher must consider the elements of learning that are targeted in a lesson as well as the developmental stage of the learner prior to the introduction of any technological lesson promoted by cognitive flexibility theory. Failure to do so can result in a well developed instructional computing technique being used in an inappropriate situation (Jacobson, & Spiro, 1991). This warning echoes a warning given to any social studies teacher contemplating the use of technology. A teacher needs to understand the implications of any software intended for classroom use and the connection of the implications to the identified goals of the social studies class (Brady, 1994). A violation of either warning could lead to the failure of a well planned and developed instructional method.

The ideas presented by cognitive flexibility theory are difficult, for both students and teachers. They require a significant investment in time and energy. Students will invest in academic endeavors that require effort if they see a benefit for doing so (Newmann, 1991a; Noddings, 1993). For teachers, the hard work must been seen as the price to pay for advanced knowledge acquisition. Teachers must recognize the hard work that will be needed before utilizing any of these ideas. There are data that indicate that difficult instruction tends to be neglected, at a great cost to learning outcomes (Spiro et al., 1988). It is the responsibility of the teacher to make advanced learning as easy as possible, both for themselves and for the students, without sacrificing the integrity of what is being studied (Spiro, & Jehng, 1990).

The ideas associated with cognitive flexibility theory are particularly relevant for this study. Specifically, by identifying a research path that this study follows: the skills-theory connection which “employs a knowledge acquisition and transfer methodology to directly test central elements of cognitive flexibility theory itself” (Jacobson, & Spiro, 1995, p. 328). The subjects of this study will demonstrate, after their internship experiences, whether they will choose to represent a simple or complex conceptual representation to their students in an “ideal” setting. This choice will demonstrate whether they have moved beyond introductory knowledge levels towards advanced knowledge which will lead them to expertise through practice. The teacher who chooses to move toward advanced knowledge will be the teacher who is more likely to contextualize the classroom in such a way that all students will be able to identify what understanding means, as well as progress towards the acquisition of the skill and the means to activate the same (Bernstein, 1990; Resnick, 1987b) This is a major basis for this study.

Technology

Since the advent of formal schooling, teachers have used technology. From the slate to the chalk board and from the opaque projector to the overhead transparency, technology in the classroom has changed. However, the methods and means of the individual teacher in the classroom have not changed substantially. Papert (1993) theorized that if a group of 19th century educators were transported into a current classroom, they could take over the operation of the classroom, even though there might be some objects with which they were unfamiliar. Papert compared this result to the reaction of a hypothetical group of 19th century doctors entering a modern surgery. The doctors from the previous century would not be able to follow what was going on, much less to take over for the modern physicians. Teaching should be characterized by expertise and technological literacy. As Selwyn (1995) indicated, teaching is:

> the art of connecting students with course content in personal, relevant, and exciting ways. Teachers who do not involve their students in course content are failing to educate them fully. (p. 71)

Students of today use technology, including computers, in many facets of their lives out of school. In order for any topic or subject to be made relevant to them, it must involve them personally. Technology is means for involving them.

Too often, teachers have viewed technology as a cure for problems and not as a means which might be applied in order to respond to problems. Too many educators and teachers have reasoned as follows: plug in technology, in terms of hardware dollars spent, and all problems are solved (Means, & Olson, 1994; Osborn, & Wilson, 1990). In some cases schools have been seen as being technologically advanced, if computers are in the schools, even if they were located in the administrative suites (Ely, 1995). The other extreme of this issue has also led to improper conclusions when educators and teachers have viewed technology as a passing fancy (Carr, 1988). They have not given computers the attention they deserve.

For more than a decade, the use of computers has increased. In 1984, the ratio of students to computers was 75 to 1, in 1994 the ratio was 12 to 1 and virtually every school in the country owned computers (Ely, 1995). However, only 3% of instructional spaces in public schools have been connected to the internet. Furthermore, most computers have been located either in media centers or administrative offices (Heaviside, & Farrio, 1995). Most teachers have been exposed to the uses of technology, during preservice or in-service training and many report that it has changed their view of teaching. However, although teachers report that their use of computers, and related technology, has changed the way they teach, researchers have been unable to document this claim (Miller, & Osborn, 1994; Sivin-Kachala, & Bialo, 1994). Rather than finding change, investigators have reported that teachers continue to rely on familiar methods, running an old machine with a new engine (Shields, 1993).

Although many teachers have reacted positively to computers, others have chosen to attack the use of computers in the classroom (Papert, 1993). For these teachers, the computer threatens conventional behaviors and teaching cultures that have been established. (Goodson, & Mangan, 1991). At the personal level, teachers have feared computers. Often, they lack both competence and confidence. Frequently they possess less skill and confidence than their students (Papert, 1993). They often lack the time to prepare themselves to use computers, and few arrangements have been made to provide time for classroom applications (Goodson, & Mangan, 1991). Both teachers and the entire school community have failed to recognize the amount of time and effort that will be required if the new technology is to be addressed to understandable goals such as higher order thinking or the generation of discourse (McDaniel, McInerney, & Armstrong, 1993). Reaping the benefits of computer technology will require extrinsic teacher training, new curricular methods, and changes in educational models (Ely, 1995). As Poole (1995) has suggested:

> Education must therefore, continue to broaden its definition of what constitutes a successful student, for no two graduates will be equally or identically shaped by what goes on in schools. (p. 406)

The school must no longer be looked upon as a factory, producing identically prepared students. Instead, each student needs to be presented with the opportunity for personalization of instructional goals (Powell et al., 1985). Teachers in the field need to look to research as guide for where to develop these new ideas.

Research into the uses of computer technology in education has lagged behind the needs of the classroom teacher during the decade of the 1980's (Heinrich, 1985). In the 1990's, research has entered a new stage. Studies have focused on the intention of learners, learning variables, and teaching variables (Maddox, 1995). Sivin-Kachala and Bialo (1994) conducted a review of this research and developed general conclusions. These included:

> 1. Educational technology has a significant positive impact on achievement in all subject areas, across all levels of school, and in regular classrooms as well as those for special-needs students.
> 2. Educational technology has positive effects on

student attitudes.
3. The degree of effectiveness is influenced by the student population, the instructional design, the teacher's role, how students are grouped, and the levels of student access to technology.
4. Technology makes instruction more student-centered, encourages cooperative learning, and stimulates increased teacher/student interaction.
5. Positive changes in the learning environment evolve over time and do not occur quickly. (Mehlinger, 1996, p.405).

These conclusions demonstrate that technology has power. Those who have used technology prudently have shown us that it also has the potential to reshape education and meaning as well (Apple, 1988; Winner, 1986). Too often, however, the demonstrations in research have not been translated into classroom use.

The computer has been shown to be well suited for familiarizing students with the processes that are utilized by social scientists in order to form concepts (Tolman, & Allred, 1991). Despite these findings, it has been demonstrated that the use and intent of the computer as an instructional tool by social studies teachers is limited (Schmid, 1990). Ignorance and a lack of experience with computers possibly explains this contradiction. Social studies teachers as a group possess relatively little knowledge of technological uses in the classroom when compared with math and science teachers (Hoge, & Saye, 1994; Northrup, & Rooze, 1990; Rooze, & Northrup, 1989; Schug, 1988). Because they lack understanding, social studies teachers have either used computer technology in order to sustain existing curricular objectives or they have employed computer technology for isolated activities unrelated to an established instructional theme or topic (Moersch, 1995). The gap between what is available and what is being used has become colossal (Butler, & Clouse, 1994).

Ross (1988) attempted to explain why social studies teachers lack knowledge and experience regarding computer and technology usage. These included the lack of computers for teacher use, simply finding equipment for classroom use as well as planning. The lack of quality software has hindered classroom use. Too often the software available follows drill and practice notions and goes no farther towards higher order skills. The ambivalence of research findings on the effectiveness of computer based instruction gives teachers the impression that computer usage has no direct correlation to their classroom. Teachers need research to give them an explicit connection to their classroom. Additionally, the lack of teacher knowledge and skills regarding instructional uses of the computer hampers computer usage. Teachers do not have the training to use the equipment they currently have, let alone having the knowledge to ask for items they are lacking. Finally, the lack of software which is integrated into the social studies curriculum explains why more teachers have not utilized the computer in social studies. Frequently, the materials which are available to the teachers are arranged for general education or math and science exercises and not for social studies curriculum ideas. Since 1988, more computers, more software, and more training have been made available to social studies teachers; however, computer usage in the classroom has not been commonplace. Researchers have suggested two reasons which may explain this phenomenon. One, social studies teachers in general and historians in particular are the last to implement technology for education (Janger, 1988). Two, social studies teachers rely on the textbook as the official cannon and chief tool available for them as teachers.

The textbook has become the major force in the classroom. While social studies teachers have often supplemented the textbook with other information (Jackson, & Haroutunian-Gordon, 1989), the textbook is still the major source of information, if not the only source of information. Classrooms are still textbook based and lecture driven (Butler, & Clouse, 1994; Caine, & Caine, 1995). Kon

(1995) identified three ways in which a textbook is used by the teacher, the text as curriculum, the text as an active but not primary resource, and the text as a limited resource.

Traditionally, social studies and history have been taught through the use of a single textbook (Napier, & Hoge, 1995). Textbooks are very convenient for social studies teachers, especially those who are not well versed in the discipline they teach; it is one stop shopping. In them, they expect to find everything they need to teach a course of study (Stodolsky, 1989). Unfortunately, such courses provoke neither thought nor discourse. The following problems have been associated with textbook driven instruction. Students see history textbooks as boring. This results in students viewing the class as being boring (Downs, 1993). Students do not perceive that the textbook matches their understandings of the topics studied in history (Levstik, 1993). Textbooks operate under the assumption that students come to the class empty of knowledge, and need to be filled with new information (Gibson, 1993). Students in such a class are unlikely to be able to engage in the active comprehension needed for higher order thinking and reasoning about historical events (Beck, McKeown, & Gromoll, 1989). Since textbook prose is seldom dramatic, students view textbook driven classes as boring. Textbooks tend to bracket controversy and they seldom challenge students to examine their fundamental assumptions about human beings and their institutions.

Other problems with textbook driven instruction have been identified. Because politics and pressure groups play more of a role in textbook production than education does, controversy is avoided (Fleming, 1992; Middendorp, 1994). Because publishers want to sell their books to the most people and in the most places possible, authors attempt to include all information that might be of use at anytime in any place, at the cost of developing any depth for the topics addressed (Tomlinson, Tunnell, & Richgels, 1993). Faced with a lack of space for depth of coverage, textbooks authors choose to sacrifice elements of affect or emotion in the study of history. Eisner (1991) declares:

> Text, particularly the text of textbooks, as contrasted with literary history, is often so eviscerated of affect that the feel of the period can not be experienced. A lifeless text about a different and painful period in American History is a kind of lie. In this sense, many of the textbooks provided in school lie. (p. 583)

Even well written texts seldom produce an emotional response on the part of children.

Computer technology can reduce teacher dependence on the textbook. Computer technology can become another tool used by teachers who choose materials and methods in order to pursue valid goals with their students (Osborn, & Wilson, 1990; Poole, 1995). In situations where the textbook has proven to be ineffective, the computer becomes another medium through which the teacher can lead the class in new directions (Cole, & Griffin, 1987; Griffin et al., 1993). The teacher has to avoid the trap of using the new technology for old methods, a mismatch which could prove dangerous for the students and teacher alike (Shields, 1993). Teachers need to use computer technology as another form of text, no more important than any other text. All texts become limited resources, each having its own strengths and appropriate uses (Kon, 1995). Poole (1995) indicated that computer technology can be used to convey subject matter graphically, to provide students with situations for decision-making regarding their own learning, and to provide opportunities for more social interaction. All three of these points leads to the next areas of technology for the classroom, the use of interactive technology.

While many students are learning successfully in classrooms that utilize traditional methods of instruction, many students have been shown to be lacking knowledge in certain important areas, including the social sciences (Boyer, 1983; Goodlad, 1984; Powell, Farrar, & Cohen, 1985; Ravitch, & Finn, 1987). In order to reach these students, teachers need to contextualize in such a way as to make all material understandable to each student (Bernstein, 1990).

Interactive technology makes possible a nonlinear approach that is inherently different from approaches used to read a book, for example a textbook (Kaha, 1995). A book has a beginning, middle, and end, established and immutable. Interactive technology presents the opportunity for a thousand different possible scenarios of a story, through changing the order in which text is viewed while not changing the text itself (Bocter, 1991). The computer can allow the teacher to contextualize the classroom, creating an environment where higher order thinking is not just a word used, but an everyday practice (Hattie, 1990). Giardina (1992) has concluded that the variety of stimuli allowed by an interactive environment allows for learning situations that might boost learning. The interactive structure also allows for lessons to be personalized for each student and their own learning styles. Gay (1991) has reported that modifying structures of learning activities has been seen to assist the comprehension of minority group students. Other researchers have reported similar results with other cultural groups and in various instructional situations (Bitter, 1994; King, 1990; Litchfield, 1990). When teachers have utilized these methods, students' retention of information appears to have been enhanced over periods of time, as well as in short term studies (Giardina, 1992).

The use of interactive technology allows for a more student centered environment, where student teacher interaction occurs frequently (Sivin-Kachala, & Bialo, 1994). This allows students to be active participants in knowledge creation, which has been identified previously as a needed element (NCSS, 1994). Interactivity also allows for the creation of a classroom which is cognitively flexible, following the ideas of Spiro and his associates (1988). The multiple connections that can be created within the study of any particular lesson would seem to fit into the cognitively flexible classroom recommended by Spiro rather than the traditional teacher centered classroom (Fischer et al., 1994; Moersch, 1995). Interactive lessons might also help in the maintenance of an academic workplace by allowing the teacher to monitor group activities and hold all students accountable (Kounin, 1970). Additionally, interaction might be used to combat forgetting, distortion, and the rejection of academic principles and concepts (Caine, & Caine, 1991). Interaction might provide the teacher with another means to "frame" the lesson in a manner in which both the teacher and the students, all of the students not any single group, understand what is occurring and the reasons for it (Goffman, 1990).

For interaction to function, teachers must make interaction relevant to the purpose of the classroom (Merrill et al., 1996). Teachers must help students to see the meaning of new information and how such information may be organized in order to yield understanding (Caine, & Caine, 1995). When students have been made aware of the reasons for using technology, technology has had a positive impact on student motivation (Robertson, 1978; Schumk 1990; Sivin-Kachala, & Bialo, 1994; Zimmerman, 1989). In order to help students understand the reasons for using technology, teachers must consider the prior experiences and interests of students. Through such means teachers can develop opportunities to present materials in ways which take advantage of the natural behaviors of children (Strommen, 1993; Wagner, 1994).

What is needed in order for technology to become part of the social studies classroom? Butler and Clouse (1994) suggested five guidelines for the successful use of computers:

> 1. Development of detailed guidelines for orchestrating research projects.
> 2. Intensive teacher training.
> 3. Design and development of easy to use software that facilitates the task at hand rather than hindering it.
> 4. Provide planning time for teachers, both as a group and as individuals.
> 5. Reward systems for innovators and pioneers. (p. 27)

As indicated here, one of the major obstacles to teacher utilization of technology is time. The entire school community must recognize the time commitment beforehand, extra planning periods for example, if technology is to be implemented successfully (McDaniel et al., 1993; Meier, 1993). Besides time, another obstacle develops in how technological decisions are viewed. Computer use is often one step removed from the classroom teacher. District, state, national, and even school plans do not often create a link between technology and long term instructional goals, such as higher order thinking. Instead, they emphasize the need to meet a certain ratio of computers/students or a need for area networks (Moersch, 1995).

A change of mentality towards technology is needed inside the classroom as well. Teachers need to stop acting as gatekeepers to the technology, controlling the access of students (Weigland, 1985). Instead, teachers need to follow the ideas of Spiro (1988) and

Habermas (1992) and create flexible situations where students can actively pursue knowledge in situations where discourse is not only permitted, but emphasized.

In terms of setting standards for teacher utilization of technology, the International Society for Technology in Education (1992) has put forward a list of abilities which would characterize programs which successfully applied technology. Teachers would do the following:

> 1. Evaluate and use computers and related technology to support the instructional process.
> 2. Apply instructional principles, research, and appropriate assessment practices to the use of computers and related technology.
> 3. Explore, evaluate, and use computer/technology based materials, including applications, educational software, and associated documentation.
> 4. Design and develop learning activities that integrate computing and technology for a variety of student grouping strategies, and for diverse populations.
> 5. Evaluate, select, and integrate computer/technology based instruction in the curriculum of one's subject areas and/or grade levels.
> 6. Demonstrate knowledge of equity, ethical, legal, and human issues of computers and technology use as they relate to society and model appropriate behaviors.
> 7. Apply computers and related technology to facilitate emerging roles of the learner and educator. (International Society for Technology in Education, 1992, p. 8).

As these descriptors demonstrate, the proper use of technology in the classroom will require teacher commitment. Technology needs to be integrated into a "broad effort for school reform, and considered not as the instigator of reform or a cure-all, but as a set of tools to support specific kinds of instruction" (Means, & Olson, 1994, p. 221). Just as using only the textbook would be a disservice, so would the sole use of technological examples. A balance needs to be struck. Reform movements that stress technological innovation in the classroom share a common notion. Training in the technology available for the classroom has to begin during teacher training, if teachers are going to enter service able to utilize technology.

Teacher Education

Technology has been and is recognized as a important component of teacher education. The missing ingredient in many programs has been an overall vision, to guide the role of technology in education (Louis, & Miles, 1990). Technology has been used in a number of ways in teacher education programs. Technology has been used to teach about technology. Technology has been used to improve the delivery of current programs. Technology has been used to restructure teacher education (Bright, & Waxman, 1993). It would be impractical to expect all teacher education programs to treat technology identically, however each program can be expected to use one of these three means. The importance lies in providing students with new ideas that can bring about a connection between educator and student (Floden, & Klinzing, 1990; Lampert, & Clark, 1990).

Alder (1991) proposed a multidimensional course of study for preservice teachers which recognizes the complexities of being a teacher. Contextualizing the classroom into an academic workplace will require that teachers process information in ways that often cannot be anticipated; therefore, it is vital that teacher training prepare them for this contingency. Technology is one way of doing so. Technology can be applied in order to help preservice teachers recognize new and emerging roles of the learner and educator (International Society for Technology in Education, 1992). Moersch (1995) argued that the student teachers can be shown that technology can serve as an agent of change, instead of settling for the sustaining existing curricula. Other researchers have stressed that emphasizing technology in teacher education would serve as a means for upgrading teacher education to the level of other professional, academic, and clinical programs (Goodlad, 1990;

Howey, & Zimpher, 1986; Nelson, 1990; Scannel, 1984; Wallace, 1986; Zeichner, & Liston, 1990). However, teacher education lagged behind other groups with regard to the integration and use of technology (Heinrich, 1985).

If teacher education programs are to serve the function of preparing teachers for the classroom, technology should be a component of their preparation program. Furthermore, the focus must be learning. This focus on learning, will differ from what many teacher educators have been emphasizing (Copeland, 1989; Winn, 1989). Given this shift, teachers can learn to apply technology in order to forge a closer connection between teacher education and the use of technology (Brooks, & Koop, 1989; White, 1991). Johnson and Harlow (1993) have presented the following scenario. Technology use will begin on a small scale. It will start during the period of teacher training. There it will "trickle down" into the teaching practices of the schools (Johnson, & Harlow, 1993, p. 361). These changes will involve the development of communities in which students and teachers investigate areas of interest and information is exchanged freely between school, university, and community. An example of this type of environment can be seen in the Professional Development Schools which are a collaborative effort between local schools and universities (Corbin, 1985; McDaniel et al., 1993).

This type of effort illustrates broad based reform efforts which include technology as an important part of the revision (Means, & Olson, 1994). This change calls for a shift from traditional learning assumptions, decontextualized knowledge that can be easily transferred to students, to the development of knowledge through active engagement in an environment contextualized by the teacher (Fischer et al., 1994). As students become more actively involved they tend to become a larger part of the classroom and display a larger disposition to do so (Newby, 1991). The same idea applies to preservice teachers. Teachers in the classroom sometimes feel the students know more about computers than they do. As Chris Dede has noted:

> One of the mistakes we made in implementing educational technology was focusing first on students, rather than teachers, because when the computers on the students desks are mysterious devices to teachers, it's unreasonable to expect effective integration into the curriculum. (O'Neil, 1995, p. 7)

Unless teachers are confident of their ability to use the computer, they tend to shy away from its use. Instead they choose something they know they can handle, confronted by innovation they choose noninvolvement because they feel inadequate (Ellen, 1987). Exposing preservice teachers to technology increased their motivation to use technology and has increased the likelihood that they will utilize technology in their classroom (Williams, & Matthew, 1995). If preservice teachers develop confidence that they can control and use technology, they can then provide the same service to their students. As students become more capable of using the computer and interactive technology, the teacher can and should create an electronically interactive learning environment (Semonche, 1992).

Student teachers need to see the explicit examples of ideas which can be effective when they are in their own classroom. Teacher education programs can provide demonstrations of such visions. These demonstrations will provide teacher trainees with access to mental activities that are normally hidden from view. "Through observing others, students can become aware of mental processes that might otherwise have remained entirely implicit" (Resnick, 1987a, p. 40). Teachers learn not only from what they are taught, but more importantly how they are taught. (Haipt, 1994). Through these methods, preservice teachers are more likely to develop professional dispositions necessary to apply professional knowledge garnered during training (Katz, & Raths, 1985).

The disposition to utilize the skills and knowledge garnered during a teacher education program will rely heavily upon each students meta-cognitive ability. Student teachers have been shown to operate with a simple and disconnected schema, when compared to the rich schema utilized by their cooperating teachers (Borko, & Livingstone, 1989). Through the use of computer technology, in partnership with other instructional means, teacher education programs can develop connections which allow each student to reflect on their own schema and as a result develop methods of enrichment. These connections can develop through the use of a framework for conceptualizing reflection (Hatton, & Smith, 1994). While student teachers might initially be hesitant to reflect on their own teaching performance, the teacher education program can develop this ability through the effective use of debriefing.

Debriefing has been shown to be an effective means of supporting achievement in simulation situations (Chiodo, & Flaim, 1993). Without this meta-cognitive ability, the preservice teachers might find themselves less prepared to react to changes in the classroom (Carter, Sabers, Cushing, Pinnegar, & Berliner, 1987; Strahan, 1989). Even if preservice teachers decide to utilize traditional methods of instruction rather than something involving technology, it is the choice and the reflection on those choices which are important. Teacher education programs need to provide an introduction to what teaching is actually like (Tracy, Sheenan, & McArdle, 1988). There is no single method or standard way in which a teacher can present material. Although educational policy sometimes makes it seem as if a single method were the best, successful teachers have to develop their own means of instruction with particular groups of students (Kon, 1995). Technology in teacher education, therefore, provides a means for introducing preservice teachers to what they can expect to do in the field.

When teachers prepare themselves to teach they develop cognitive maps for the courses they will teach and employ scripts in order to carry out their plans. As the academic year unfolds, they respond to unpredicted events and problems by making the accommodations necessary to carry out their plans. As they do so, they employ their tacit theory of teaching and apply norms in order to assess their successes and their failures as teachers. Such accommodations enable them to enact their theory of teaching successfully and to rest content with their accomplishments and the current state of schooling (Bernstein, 1990).

Whereas the attributes of effective questions (as well as other skills and functions) tend to remain constant across teaching fields (Berliner, 1986; Bernstein, 1990), the evidence continues to mount that unless social science teachers acquire such concepts and refine their use within social science contexts, then they are unlikely to associate them with the teaching of the social sciences, and hence unlikely to activate the skills they possess under conditions of practice (Costa, 1991; Gardner, 1991; Resnick, 1989). Much the same case can be made for other dimensions of teaching, such as the representation of disciplinary communities (Polanyi, 1958); the transformation of disciplinary knowledge into appropriate activity structures (Schulman, 1987); and the definition of academic courses of study (Burt, & Want, 1975; Hubberman, 1985; Newmann, 1988).

If teachers are to learn to practice their clinical profession professionally, then they must challenge the prevailing orientation and acquire the ability to accept responsibility for causing learning and growth to occur within the constraints and possibilities of their classroom and school site (Boyer, 1983; Doyle, 1986; Powell et al., 1985; Sedlack et al., 1986; Sizer, 1984). To exploit the advances made possible by technology, teachers need to allow technology to permeate the culture of education, possibly against the conventions of the school in which they teach (Peha, 1995).

Teachers must help students to see the meaning of new information and the links to their own understanding (Caine, & Caine, 1995). This might require the use of different classroom practices for each child in the room, since using the same method for all students can be dangerous for many learners (Dunn, 1995). Preservice teachers must be shown the different learning styles of students and develop the means of capitalizing on those lessons and strategies which best fit the abilities and learning style of each student (Kaha, 1995). This will directly tie into the preservice teachers understanding of culture, both their own, and that of each of their students.

Not knowing the strengths of students can lead to teaching down to children socialized from communities that are culturally different from that of the teacher. Teachers then focus on giving these students the skills they will "need to survive." Such teachers invest so much time on remedial information, that they rarely introduce students to what learning should be or how to go about doing it (Delpit, 1992). Students from other cultures need to construct their own knowledge, as with any other student, however they also need to be in an atmosphere that will empower them to do so instead of expecting them merely to survive (Banks, 1994).

Preservice teachers need to be shown explicitly that by understanding the influence of culture on their students, authentic lessons can be developed which keep societal differences in mind (Barnitz, 1994). For example, the use of a participatory framework which provides for interaction between teacher and students works better for many African American students than the standard lecture method (Delpit, 1992; Heath, 1989). This becomes especially important when dealing with technologies. The implementation of computers raises cultural problems as well as technical ones (Goodson, & Mangan, 1991).

Often, technology is seen as being culturally neutral, when in fact it is not. This would be similar to saying that a pencil has no culture in the hands of Martin Luther King or Adolph Hitler (Bowers, 1988). Students and teachers alike need to be shown the importance of reading who the writer of the software happens to be as much as they should read who is the author of a book. Preservice teachers need to be able to see the power of culture even over something that appears to be immune to its effects. Along with technology in teacher education programs, multicultural education must also be a large part. Students who had completed a course in multicultural education have been shown to be more aware of multicultural issues being raised than those students who did not have a multicultural education course (Ehman, Glenn, Johnson, & White, 1992).

In addition to the cultural problems that need to be recognized, there are other problems that need to be mentioned. Preservice teachers need to be shown that the use of the computer will not be a easy one in the beginning. Unless teachers are aided in the proper use of the computer, they are unlikely to use them (Ross, 1991). Preservice teachers need to be shown the time investment and the benefits of the computer before they are in service. This will save valuable time in the field for production of computer and technological lessons. Additionally, preservice teachers need to be shown the problems that can be associated with software that is available for education. Teacher education programs need to give their students opportunities to interact with different varieties of software and to evaluate their potential benefits and liabilities. For instance, drill and practice software can be an entertaining device for some students, while for others it can lead to students being contextually welded to certain circumstances and even less likely to transfer knowledge (Salomon, & Perkins, 1989).

Additionally, teacher education programs need to assist their students in understanding the implication of software programs when they are applied to the social sciences. Software can be aimed at a variety of areas of the social sciences, such as citizenship transmission, reflective inquiry, or a particular social science. If the teacher is not aware of the implications of a given program, it could be used inappropriately or even in ways which are harmful for students (Brady, 1994).

Finally, teacher education programs must recognize the benefits and problems associated with technology in the future of classroom teaching. The good news comes in the form of revitalizing energy, at the very least new opportunities, that technology can bring to teacher education and the classroom. The bad news comes in the message that technology changes so rapidly that by the time it is fully understood, researchers find it has changed again (Bright, & Waxman, 1993). This only becomes a major problem for teacher education if it is not recognized. Teacher education programs need to provide a general education in the methods of technology and education, not specific training in a certain style of brand of technology. With general knowledge, preservice teachers will be able to adapt to any new technological change that become available to the classroom teacher.

Summary

The quest to establish an academic workplace for students in the classroom has provided the basis for this study. Research related to the construction of meaning has provided valuable information about the classroom as a social location where understanding is the goal. Technology has been used within the classroom and in order to present information in a manner which allows students to encounter information from different perspectives. Research studies have established guidelines for introducing computer technology into preservice teacher education programs. Starting at this point provides a major push for each preservice teacher, a push towards contextualizing the classroom in such a way that higher order thinking is a practical idea which leads to the development of student discourse.

CHAPTER 3
METHODOLOGY

The purpose of this study was to investigate the levels of interactivity in lessons created by preservice teachers when utilizing presentational software, specifically, the program Astound. This chapter describes the population and sample used in the study, the design and data collection procedures, the variables and related information used in measurement, the hypotheses to be tested, and the statistical treatment of the data.

Population and Sample

The population of the study consisted of preservice social studies teachers in north central Florida. Twenty members of the secondary PROTEACH program at the University of Florida participated in the study.

Design and Data Collection

Prior to the study, the University of Florida's Institutional Review Board granted permission for the investigation to take place. The subjects were informed about the study and their consent was given (Appendix A). Each of the subjects was a member of a class where interactive presentation software, specifically Astound, was introduced. During the class, each subject created a presentation using Astound which required research and group participation. During the student teaching experience, the subjects continued to use Astound. Following student teaching, each preservice teacher was asked to develop presentations of a lesson using Astound. Each student developed a single lesson with as many daily episodes as needed to cover the topic with the minimum number of episodes per student being two. The lessons were ideal lessons, using information covered during their internships, presented with all constraints of the intern classroom removed. Each episode was coded to indicated the amount of interactivity present using an interactivity measure (IM) created for this study.

Following the presentation of lessons, interviews were conducted with each subject. The interviews provide a foundation for a qualitative view of lesson development. A question of interest was the interconnection between the topic chosen for the lesson and its adaptability to interactivity. The interviews attempt to approach an area that is often missed in studies, the link between achievement and learning (Chiodo, & Flaim, 1993). A researcher needs to not only determine what has occurred, but also the reasons behind the occurrence.

Variables

1. The Interactivity Measure (IM) is defined as the total number of interactive options developed by the subject in each episode. An option is considered interactive if, and only if multiple destinations are possible.

2. Interactivity was measured by comparing the IM for each episode. Using this score the episodes were placed in one of two groups, interactive and linear. If a presentation contains five or more IM, the presentation was considered interactive. If less than five IM are coded, the presentation was considered linear.

3. Level of school was the level of the internship experience for each subject, middle or high school.

4. Computer modeling was determined by the students answers

to the question, "Indicate the amount of computer usage modeled by your supervising teacher; none, slight, or significant." The subjects were placed into one of three groups accordingly.

5. Computer lab was determined by the absence or presence of a computer lab at the intern school. A computer lab was considered present if and only if the equipment is available at the school for use by the social studies class. The opportunity for use must be reasonably present.

6. Subject taught was determined by the subject matter presented in the lesson developed. These included American History, World History, Geography, and Political Science. Each participant was placed into a group according to subject matter presented.

7. Subject matching was determined by comparing the subject presented with the undergraduate major of the participant. Accordingly each participant was placed into a matching or not matching group.

Hypotheses

The following hypotheses were tested:

1. There is no difference in all possible pairwise comparisons

of interactivity with regard to interactivity measure (IM).

2. There is no difference in all possible pairwise comparisons of grade level with regard to IM.

3. There is no difference in all possible pairwise comparisons of computer modeling with regard to IM.

4. There is no difference in all possible pairwise comparisons of computer lab presence with regard to IM.

5. There is no difference in all possible pairwise comparisons of subject taught with regard to IM.

6. There is no difference in all possible pairwise comparisons of subject matching undergraduate major with regard to IM.

7. There is no difference in all possible pairwise comparisons of the two factors interactivity and grade level with regard to IM.

8. There is no difference in all possible pairwise comparisons of the two factors interactivity and computer modeling with regard to IM.

9. There is no difference in all possible pairwise comparisons of the two factors interactivity and computer lab presence with regard to IM.

10. There is no difference in all possible pairwise comparisons of the two factors interactivity and subject taught with regard to

IM.

11. There is no difference in all possible pairwise comparisons of the two factors interactivity and subject taught matches undergraduate major with regard to IM.

Statistical Treatment of Data

The researcher generated descriptive statistics for each group. The quantitative data was then statistically studied and the qualitative data described. For the first six hypotheses, the Shaffer-Holm procedure was conducted for all possible pairwise comparisons (Algina, 1996). This method was selected for two reasons; first, the method utilizes the omnibus test for the entire factor and second, the method is more powerful than other measures when unequal sample sizes are utilized. Additionally, this method controls the familywise error rates which could cause problems in multiple comparisons.

For all hypotheses, the omnibus tests were conducted using an analysis of variance. An analysis of variance (ANOVA) partitions the total variation of a sample into components and tests that the means are equal. The components, between group variance, and within group (error) variance are used to compute an F ratio that evaluates the effectiveness of the model (Myers, & Well, 1991). The purpose of one-way ANOVA, used for the first six hypotheses omnibus test, is to compare the means of two or more groups in order to decide whether the observed differences between them report a chance occurrence or a supplemental effect (Shavelson, 1988).

For each comparison in the first six hypotheses, the Shaffer-Holm procedure was conducted. The first step in the procedure is the omnibus test to determine if any significant difference existed between any level of a factor. The null hypothesis for each factor was:

H_O: There is no difference in any of the possible pairwise comparisons of the factor.

The structural model for this test is the following.

$$Y_{ij} = \mu + \alpha_j + \varepsilon_{ij}$$

Where

Y_{ij} = the score of the ith individual in the jth group.

μ = the parent population mean.

α_j = the effect treatment

ε_{ij} = the error component - if the null hypothesis is true this is the only source of variance in the data matrix.

(Myers, & Well, 1991, p. 97)

If the omnibus test indicates a significant difference, the procedure calls for a comparison of each of the possible pairwise comparisons, if there are more than two levels of the factor. The test statistic used for multiple comparisons of a one factor design is:

$$t = \frac{Y_i - Y_j}{\left[MS_{s/a} \; (1/n_i + 1/n_j) \right]^{1/2}}$$

Where Y_i and Y_j are the sample means of the two levels, $MS_{s/a}$ is the mean square of the error component, and n_i and n_j are the number of subjects in each cell.

The critical value for comparison = $\pm\, t_{\alpha\ FW,\ C,\ N\text{-}J}$

where c is developed from the table in Appendix B, N is the total number of subjects, FW refers to alpha value set to control the familywise error rate, and J is the level of the factor under consideration (Algina, 1996).

For the last five hypotheses, the Shaffer-Holm procedure will again be utilized but in a slightly different manner. In this set, for each two factor comparison the guidelines for this type of study will be followed (Appendix C). As with the one factor design, the first test needs to be the omnibus test of the null hypothesis. In this case the null hypothesis was:

H_o: There will be no difference in all possible pairwise comparisons of means of interactivity and any other factor.

The difference in this procedure, from the one factor procedure, appears in the first item of interest which is the presence or absence of interaction. This will determine the course through the guidelines. The structural model used for testing two factor ANOVA follows:

$$Y_{ijk} = \mu + \alpha_j + \beta_k + (\alpha\beta)_{jk} + \varepsilon_{ij}$$

Where

Y_{ijk} = the ith score at jth level of A and kth level of B.

μ = the parent population mean.

α_j = main effect of treatment A_j

β_k = main effect of treatment B_k

$(\alpha\beta)_{jk}$ = interaction effect of A_j and B_k.

ε_{ij} = error component

In the two factor procedure the presence or absence of interaction dictated whether the cell means were compared or the marginal means were compared for data interpretation. For the comparison of two cell means, the following formula was used:

$$t = \frac{Y_{jk} - Y_{j'k}}{\left[MS_{s/ab} \ (1/n_{jk} + 1/n_{j'k}) \right]^{1/2}}$$

Where Y_{jk} and $Y_{j'k}$ are the sample means of the two cells being compared, $MS_{s/ab}$ is the mean square of the error component, and n_{jk} and $n_{j'k}$ are the number of subjects in each cell. The critical value for comparison = $\pm t_{\alpha \text{ FW, C, N-JK}}$ where c is developed from the table in Appendix B, N is the total number of subjects, FW refers to alpha value set to control the familywise error rate, and J is the level of factor A and K is the level of factor B under consideration (Algina, 1996).

If the comparison needed for the procedure involved marginal means, the following formula was used:

$$t = \frac{\Sigma W_{jk} Y_{jk}}{\left[MS_{s/ab} \, \Sigma W^2_{jk}/n_{jk} \right]^{1/2}}$$

Where W_{jk} signifies the weight of a comparison and Y_{jk} signifies the mean of a particular margin and $MS_{s/ab}$ is the mean square of the error component, and n_{jk} indicates the number of subjects in each cell. The same critical value as cell mean comparison was utilized.

Interviews

Following data collection, an interview was conducted with each of the subjects. The interviews were structured and a copy of the interview questions can be found in the Appendix D. The purpose of the interview is to provide background information for lesson development. The issues that become apparent from the interviews will be discussed in chapter five.

CHAPTER 4
ANALYSIS OF DATA

This chapter contains the descriptive statistics for the variables of interest and the data analyses pertinent to the questions of this study. It also includes the results of a qualitative investigation by interview.

The purpose of this study is to investigate the levels of interactivity in lessons created by preservice teachers when developing lessons utilizing presentational software, specifically, the program Astound. These ideal lessons created by the preservice teachers explore the notion of higher order thinking, specifically whether the conditions encountered during field experiences influence the actions of preservice teachers regarding their ideas of contextualization in the classroom.

The Shaffer-Holm procedure, which utilizes analysis of variance techniques, was used to analyze the data (Algina, 1996). Each hypothesis is stated in operational null form with the relevant statistics presented in summary tables. The descriptive statistics for each factor can be found in Table 1.

Table 1

Descriptive Statistics

Factor	Level	N	M	S
Interaction	Linear	25	1.720	1.061
	Interactive	16	11.250	8.258
Grade	Middle School	17	8.176	9.678
	High School	24	3.500	3.093
Modeling	None	18	2.278	1.742
	Slight	12	3.167	2.552
	Significant	11	13.091	9.628
Lab	Not Available	22	2.409	2.085
	Available	19	8.947	8.847
Subject match	No	17	8.412	9.559
	Yes	24	3.333	3.074
Subject taught	Am. History	10	3.100	2.132
	Wo. History	16	3.625	3.442
	Geography	7	13.000	13.392
	Political Sci.	8	5.375	4.373

Quantitative Results

The first six hypotheses stated that there is no difference in all possible pairwise comparisons within each factor with regard to interactivity measure (IM). The researcher measured the IM as the total number of opportunities for interaction in a particular episode. Interactivity was defined as the opportunity for the computer user to influence the pathway of the presentation. Interactivity may take the form of determining speed of delivery, sound, image, or film availability, and the order of presentation. If the user was simply given the opportunity to continue the presentation on a linear course, for example a button which takes the user to the next slide of a presentation, interaction was not considered to take place.

The researcher coded all lessons. To establish the statistical significance or non-significance of the differences between levels within each factor, the Shaffer-Holm procedure was followed (Algina, 1996). This method was selected for two reasons; first, the method utilizes the omnibus test for the entire factor and second the method is more powerful than other measures when unequal sample sizes are utilized. For the first six hypotheses, the omnibus tests were conducted using an one-way analysis of variance. For factors with only two levels, the omnibus test indicated the presence of significant difference. Those factors with two or more levels were further tested with the Shaffer-Holm procedure to determine the location of significant difference (Algina, 1996).

> Hypothesis 1: There is no difference in all possible pairwise comparisons of interactivity with regard to IM.

The factor interactivity contained two levels, therefore the analysis of variance indicated the results. A significant difference was found between the means of the levels of interactivity at the $p \leq .05$ level. Therefore, the null hypothesis could be rejected. The mean for the linear group was found to be 1.720 and for the interactive group 11.250. A summary ANOVA table is presented in Table 2.

Table 2

Summary ANOVA Table for Hypothesis 1

Source	df	MS	F	p
Interact (I)	1	886.0575610	32.91	0.0001
S/I	39	26.9241026		
C Total	40			

Hypothesis 2: There is no difference in all possible pairwise comparisons of grade level with regard to IM.

The factor grade contained two levels, therefore the analysis of variance indicated the results. A significant difference was found between the means of the levels of grade at the $p \leq .05$ level. Therefore, the null hypothesis could be rejected. The mean for the middle school group was found to be 8.176 and for the high school group 3.50. A summary ANOVA table is presented in Table 3.

Table 3

Summary ANOVA Table for Hypothesis 2

Source	df	MS	F	p
Grade (G)	1	217.6269727	4.94	0.0321
S/G	39	44.0633484		
C Total	40			

> Hypothesis 3: There is no difference in all possible pairwise comparisons of computer modeling with regard to IM.

The factor modeling of computer use contained three levels, therefore the analysis of variance represents the omnibus test for the Shaffer-Holm procedure. A significant difference was found between the means of the levels of modeling at the $p \leq .05$ level. Therefore, the null hypothesis could be rejected. A summary ANOVA table is presented in Table 4.

With the significant omnibus test, the comparison of means using the Shaffer-Holm procedure was then conducted to determine the location of significant difference between the levels of the modeling factor. A significant difference was determined between Significant modeling ($\underline{M}$ = 13.091) and Slight modeling ($\underline{M}$ = 3.167) as well as between Significant modeling ($\underline{M}$ = 13.091) and No modeling ($\underline{M}$ = 2.278). In each comparison, the level listed first had the greater mean score. No significant difference was determined between the Slight modeling and No modeling levels. The comparison of the t-values developed along critical values are seen in Table 5.

Table 4

Summary ANOVA Table for Hypothesis 3

Source	df	MS	F	p
Modeling (M)	2	442.9553461	16.03	0.0001
S/M	38	27.6364965		
C Total	40			

Table 5

Results from Shaffer-Holm Procedure for Factor Computer Modeling

Comparison	Step	t	c	Critical Value
None-Significant	1	-5.3745	1	±2.02439
Slight-Significant	2	-4.5223	1	±2.02439
None-Slight	3	-0.45376	1	±2.02439

Note: In this table

$$t = \frac{Y_i - Y_j}{[\, MS_{s/a} \; (1/n_i + 1/n_j)]^{1/2}}$$

Where Y_i and Y_j are the sample means of the two levels, $MS_{s/a}$ is the mean square of the error component, and n_i and n_j are the number of subjects in each cell.

The critical value for comparison = $\pm\, t_{\alpha \text{ FW, C, N-J}}$

where c is developed from the table in Appendix B and N is the total number of subjects, FW refers to alpha value set to control the familywise error rate, and J is the level of the factor under consideration.

Hypothesis 4: There is no difference in all possible pairwise comparisons of computer lab presence with regard to IM.

The factor computer lab presence contained two levels, therefore the analysis of variance indicated the results. A significant difference was found between the means of the levels of computer lab presence at the $p \leq .05$ level. Therefore, the null hypothesis could be rejected. The mean for the no computer lab group was found to be 2.409 and for the available computer lab group, 8.947. A summary ANOVA table is presented in Table 6.

Table 6

Summary ANOVA Table for Hypothesis 4

Source	df	MS	F	p
Lab (L)	1	435.8320107	11.33	0.0017
S/L	39	38.4683474		
C Total	40			

Hypothesis 5: There is no difference in all possible pairwise comparisons of subject taught with regard to IM.

The factor subject taught contained four levels, therefore the analysis of variance represents the omnibus test for the Shaffer-Holm procedure. A significant difference was found between the means of the levels of subject taught at the $p \leq .05$ level. Therefore, the null hypothesis could be rejected. A summary ANOVA table is presented in Table 7.

With the significant omnibus test, the comparison of means using the Shaffer-Holm procedure was then conducted to determine the location of significant difference between the levels of the subject taught factor. A significant difference was determined between Geography (M = 13.000) and World History (M = 3.625) as well as between Geography (M = 13.000) and American History (M = 3.100). In each comparison, the level listed first had the greater mean score. No significant difference was determined between any other subject comparisons. The comparison of the t-values developed along with the representative critical values are seen in Table 8.

Table 7

Summary ANOVA Table for Hypothesis 5

Source	df	MS	F	p
Taught (T)	3	169.1908537	4.38	0.0098
S/T	37	38.6087838		
C Total	40			

Table 8

Results from Shaffer-Holm Procedure for Factor Subject Taught

Comparison	Step	t	c	Critical Value
W. History-Geog	1	-3.329	3	±2.50774
A. History-Geog	2	-3.233	3	±2.50774
Geog- Pol. Sci.	3	2.371	3	±2.50774
A. History- Pol. Sci	4	-0.772	3	±2.50774
W. History- Pol. Sci	5	-0.6504	2	±2.33632
A. History- W. Hist.	6	-0.2096	1	±2.02619

Note: In this table

$$t = \frac{Y_i - Y_j}{[\,MS_{s/a}\ (1/n_i + 1/n_j)]^{1/2}}$$

Where Y_i and Y_j are the sample means of the two levels, $MS_{s/a}$ is the mean square of the error component, and n_i and n_j are the number of subjects in each cell.

The critical value for comparison = $\pm t_{\alpha\ FW,\ C,\ N\text{-}J}$ where c is developed from the table in Appendix B, N is the total number of subjects, FW refers to alpha value set to control the familywise error rate, and J is the level of the factor under consideration.

Hypothesis 6: There is no difference in all possible pairwise comparisons of subject taught matching undergraduate major with regard to IM.

The factor subject matching major contained two levels, therefore the analysis of variance indicated the results. A significant difference was found between the means of the levels of subject taught matching major at the $p \leq .05$ level. Therefore, the null hypothesis could be rejected. The mean for the subject not matching group was found to be 8.412 and for the subject matching group 3.333. A summary ANOVA table is presented in Table 9.

Table 9

Summary ANOVA Table for Hypothesis 6

Source	df	MS	F	p
Match (M)	1	256.6465806	5.96	0.0193
S/M	39	43.0628457		
C Total	40			

For the last five hypotheses, pairwise comparisons were planned and the familywise error rate was selected for control. The Shaffer-Holm procedure was utilized but in a slightly different manner. In these hypotheses, each two factor comparison followed the guidelines established for this type of study (Appendix C). As with the one factor design, the first test was the omnibus test of the null hypothesis. The difference in this procedure, from the one factor procedure, appears in the first item of interest which was the presence or absence of interaction. This will determine the course through the guidelines, whether marginal means or simple main effects leading to cell means comparisons were conducted.

If the factor of interest had two levels and interaction was determined to be significant, cell mean comparisons were conducted. If the factor of interest had more than two levels, cell mean comparisons were conducted only if a significant simple effect of the factor was determined. For each two factor comparison, the appropriate descriptive statistics and test statistics are included in tables.

Hypothesis 7: There is no difference in all possible pairwise comparisons of the two factors interactivity and grade level with regard to IM.

The descriptive statistics associated with this hypothesis can be found in Table 10.

Table 10

Descriptive Statistics for Interactivity vs Grade Level

		Interactivity	
Grade Level	Statistic	Linear	Interactive
Middle School	N	8	9
	M	1.375	14.222
	S	1.061	9.947
High School	N	17	7
	M	1.882	7.428
	S	1.054	2.878

A two-way ANOVA was conducted for the two factors, interactivity and grade level. Significant interaction was determined at the $p<.05$ level. The interactivity factor was found to have a significant main effect, at the p<.05 level, while the main effect of the grade factor was not determined to be significant. A summary ANOVA table is presented in Table 11. However, the main effects cannot be determined to be significant through the ANOVA because of the presence of interaction.

Table 11

Summary ANOVA Table for Hypothesis 7

Source	df	MS	F	p
Interact (I)	1	772.7844011	32.98	0.0001
Grade (G)	1	90.2656061	3.85	0.0572
IG	1	121.7580082	5.20	0.0285
S/IG	37	23.429988		
C Total	40			

Interactivity was determined to be the factor of interest to explore the differences of interactivity over the grade levels. The Shaffer-Holm procedure was used and a comparison of cell means conducted. Since both factors have two levels, a simple main effect test was not performed. The results are reported in Table 12 and indicate a significant difference in the interactive group between the middle school and high school.

Table 12

Results from Shaffer-Holm Procedure for Interactivity at levels of Grade

Comparison	Step	t	c	Critical Value
Interactive	1	-2.785	1	±2.02619
Linear	2	-0.244	1	±2.02619

Note: In this table

$$t = \frac{Y_{jk} - Y_{j'k}}{[MS_{S/ab} \ (1/n_{jk} + 1/n_{j'k})]^{1/2}}$$

Where Y_{jk} and $Y_{j'k}$ are the sample means of the two cells being compared, $MS_{S/ab}$ is the mean square of the error component, and n_{jk} and $n_{j'k}$ are the number of subjects in each cell. Factor A is the factor of interest while Factor B is the other factor. The critical value for comparison = $\pm t_{\alpha \text{ FW, C, N-JK}}$ where c is developed from the table in Appendix B, N is the total number of subjects, J is the level of factor A and K is the level of factor B under consideration.

Hypothesis 8: There is no difference in all possible pairwise comparisons of the two factors interactivity and computer modeling with regard to IM.

The descriptive statistics associated with this hypothesis can be found in Table 13.

Table 13

Descriptive Statistics for Interactivity vs Computer Modeling

		Interactivity	
Computer Modeling	Statistic	Linear	Interactive
None	N	15	3
	M	1.667	5.333
	S	1.113	0.577
Slight	N	8	4
	M	1.625	6.250
	S	1.061	1.500
Significant	N	2	9
	M	2.50	15.444
	S	0.707	9.029

A two-way ANOVA was conducted for the factors interactivity and computer modeling. A significant difference was indicated among the 3 levels of modeling and the 2 levels of interaction at the

$p<.05$ level. No significant interaction was detected. A summary ANOVA table is presented in Table 14.

Table 14

Summary ANOVA Table for Hypothesis 8

Source	df	MS	F	p
Interact (I)	1	325.351	16.62	0.0003
Modeling (M)	2	68.907	3.52	0.0405
IM	2	48.528	2.48	0.0985
S/IM	35	19.581349		
C Total	40			

Because the interaction was not significant, pairwise comparisons of the marginal means were conducted. The Shaffer-Holm procedure was used. The test statistics in size order for the factor modeling were (a) none vs significant: $t(35) = -2.4586$; (b) slight vs significant $t(35) = -2.290$; and (c) none vs slight: $t(35) = -0.225$. The test statistic for the factor interaction was linear vs interaction $t(35) = -4.075$. The critical value for the pairwise comparisons was $\pm t_{.05/2,1,35} = \pm 2.03$. The marginal means results for modeling are reported in Table 15 and indicated significant differences in the interaction measure between none and significant modeling as well as slight and significant modeling. No significant difference was indicated between none and slight modeling.

Table 15

Marginal Means and Pairwise Comparisons for Computer Modeling

Level of Modeling	Marginal Mean
None	3.499^a
Slight	3.938^a
Significant	8.97

Note: Marginal means that share the same superscript are not significantly different.

The marginal means for interaction are reported in Table 16 and indicated a significant difference between the linear and interactive levels.

Table 16

Marginal Means and Pairwise Comparisons for Interaction

Level of Interactivity	Marginal Mean
Linear	1.93
Interactive	9.01

Note: Marginal means that share the same superscript are not significantly different.

Hypothesis 9: There is no difference in all possible pairwise comparisons of the two factors interactivity and computer lab presence with regard to IM.

The descriptive statistics associated with this hypothesis can be found in Table 17.

Table 17

Descriptive Statistics for Interactivity vs Lab Availability

Lab Availability	Statistic	Interactivity	
		Linear	Interactive
Not Available	N	18	4
	M	1.611	6.00
	S	1.145	1.414
Available	N	7	12
	M	2.000	13.000
	S	0.816	8.893

A two-way ANOVA was conducted for the factors interactivity and computer lab availability. A significant difference was indicated among the levels of computer lab and the levels of interaction at the $p<.05$ level. No significant interaction was detected. The null hypothesis was rejected. A summary ANOVA table is presented in Table 18.

Table 18

Summary ANOVA Table for Hypothesis 9

Source	df	MS	F	p
Interact (I)	1	445.3590381	18.26	0.0001
Lab (L)	1	102.6724710	4.21	0.0473
IL	1	82.1948590	3.37	0.0744
S/IL	37	19.581349		
C Total	40			

Because the interaction was not significant, pairwise comparisons of the marginal means were conducted. The Shaffer-Holm procedure was used. The test statistic for the factor computer lab was not available vs available $t(37) = -2.052$. The test statistic for the factor interaction was linear vs interaction $t(37) = -4.274$. The critical value for the pairwise comparisons was $\pm t_{.05/2,1,37} = \pm 2.02619$. The marginal means results for computer lab availability are reported in Table 19 and indicated significant differences between no lab availability and lab availability.

Table 19

Marginal Means and Pairwise Comparisons for Lab Availability

Level of Availability	Marginal Mean
Not Available	3.85
Available	7.50

Note: Marginal means that share the same superscript are not significantly different.

Marginal means for interaction are reported in Table 20 and significant difference was indicated between linear and interactive levels.

Table 20

Marginal Means and Pairwise Comparisons for Interaction

Level of Interactivity	Marginal Mean
Linear	1.85
Interactive	9.50

Note: Marginal means that share the same superscript are not significantly different.

Hypothesis 10: There is no difference in all possible pairwise comparisons of the two factors interactivity and subject taught with regard to IM.

The descriptive statistics associated with this hypothesis can be found in Table 21.

Table 21

Descriptive Statistics for Interactivity vs Subject Taught

		Interactivity	
Subject Taught	Statistic	Linear	Interactive
American History	N	6	4
	M	1.667	5.250
	S	1.366	0.500
World History	N	12	4
	M	1.917	8.750
	S	0.996	2.986
Geography	N	3	4
	M	1.00	22.00
	S	1.00	10.296
Political Science	N	4	4
	M	1.750	9.000
	S	0.957	2.944

A two-way ANOVA was conducted for the factors interactivity and subject taught. A significant difference was indicated among the 4 levels of subject taught, the 2 levels of interactivity, and the interaction of subject taught and interactivity at the p<.05 level. However, the main effects cannot be determined to be significant through the ANOVA because of the presence of interaction. A summary ANOVA table is presented in Table 22.

Table 22

Summary ANOVA Table for Hypothesis 10

Source	df	MS	F	p
Interact (I)	1	815.5151515	67.87	0.0001
Taught (T)	3	92.6336207	7.71	0.0005
IT	3	112.2783438	9.34	0.0001
S/IT	33	12.015152		
C Total	40			

The presence of interaction with a factor with more than 2 levels necessitates simple main effects being tested before cell means can be compared. The simple main effect of subject taught at levels of interactivity was tested, with the interactive level found to have a significant simple main effect _F_ (3,33) = 18.0744, p=.00004. The simple main effect at the linear level was not found to be significant _F_ (3,33) =0.0566, p=.98199.

The discovery of a significant simple main effect at the interactive level necessitated a comparison of cell means of subject at the interactive level using the Shaffer-Holm procedure. The results are reported in Table 23 and indicate a significant difference in the interactive group between the Geography and American History, Geography and World History, and Geography and Political Science. No other subject comparisons were found to be significantly different.

Table 23

Results from Shaffer-Holm Procedure for Subject Taught at levels of Interactivity

Comparison	Step	t	c	Critical Value
A. Hist vs Geog	1	-6.83	6	±2.80676
W. Hist vs Geog	2	-5.41	6	±2.80676
Geog vs Pol. Sci.	3	5.3	6	±2.80676
A. Hist vs Pol. Sci	4	-1.53	6	±2.80676
A. Hist vs W. Hist	5	-1.43	4	±2.64207
W. Hist vs Pol. Sci	6	0.102	2	±2.34834

Note: In this table

$$t = \frac{Y_{jk} - Y_{j'k}}{[\, MS_{s/ab} \;(1/n_{jk} + 1/n_{j'k})]^{1/2}}$$

Where Y_{jk} and $Y_{j'k}$ are the sample means of the two cells being compared, $MS_{s/ab}$ is the mean square of the error component, and n_{jk} and $n_{j'k}$ are the number of subjects in each cell. Factor A is the factor of interest while Factor B is the other factor. The critical value for comparison = $\pm t_{\alpha \text{ FW, C, N-JK}}$ where c is developed from the table in Appendix B, N is the total number of subjects, J is the level of factor A and K is the level of factor B under consideration.

Hypothesis 11: There is no difference in all possible pairwise comparisons of the two factors interactivity and subject taught matches undergraduate major with regard to IM.

The descriptive statistics associated with this hypothesis can be found in Table 24.

Table 24

Descriptive Statistics for Interactivity vs Subject match

		Interactivity	
Subj. Match Level	Statistic	Linear	Interactive
No Subject Match	N	8	9
	M	1.750	14.333
	S	1.282	9.874
Subject Match	N	17	7
	M	1.706	7.286
	S	0.985	2.811

A two-way ANOVA was conducted for the factors interactivity and subject matching undergraduate major. Significant interaction was determined at the p<.05 level. Interactivity and subject match were found to have a significant main effect, at the p<.05 level . However, the main effects cannot be determined to be significant through the ANOVA because of the presence of interaction. A summary ANOVA table is presented in Table 25.

Table 25

Summary ANOVA Table for Hypothesis 11

Source	df	MS	F	p
Interact (I)	1	753.5558798	32.63	0.0001
Match (M)	1	114.8781938	4.97	0.0319
IM	1	112.0373514	4.85	0.0339
S/IM	37	23.093459		
C Total	40			

Interactivity was determined to be the factor of interest to explore the differences of interactivity over the subject match levels. The Shaffer-Holm procedure was used and a comparison of cell means conducted. Since both factors have two levels, a simple main effect test was not performed. The results are reported in Table 26 and indicate a significant difference in the interactive level between the no subject matching and subject matching groups with the no subject matching group having the higher mean score.

Table 26

Results from Shaffer-Holm procedure for Interactivity at levels of Match

Comparison	Step	t	c	Critical Value
Interactive	1	2.91	1	±2.02619
Linear	2	-0.21	1	±2.02619

Note: In this table

$$t = \frac{Y_{jk} - Y_{j'k}}{[MS_{s/ab} \; (1/n_{jk} + 1/n_{j'k})]^{1/2}}$$

Where Y_{jk} and $Y_{j'k}$ are the sample means of the two cells being compared, $MS_{s/ab}$ is the mean square of the error component, and n_{jk} and $n_{j'k}$ are the number of subjects in each cell. Factor A is the factor of interest while Factor B is the other factor. The critical value for comparison = $\pm\, t_{\alpha \; FW,\, C,\, N\text{-}JK}$ where c is developed from the table in Appendix B, N is the total number of subjects, J is the level of factor A and K is the level of factor B under consideration.

Qualitative Results

This study also had a qualitative component. Each of the subjects participated in an interview that lasted approximately 15 minutes. The interviews were conducted after the subjects had been given the opportunity to view the lessons of the other subjects. A major purpose of the interview component of the study was to explore the information and decision-making processes involved in lesson development and to look for any patterns of behavior.

A majority of the subjects (78 %) indicated that the lesson they chose to use for the project came from the second half of their internship experience. Almost half of the subjects indicated that the topic covered was one of the last covered if not the last covered during internship.

The subjects indicated three major reasons for the selection of the topic for the lessons. First, it was a lesson that they had done successfully during the internship which the students enjoyed. Second, it was a lesson developed for a planned observation by a university supervisor, so the subject considered it one of their best. Finally, it was a lesson which had a large visual component that they could easily translate into use on the computer. For example, one subject showed the students in the intern classroom a slide show during one lesson. The subject incorporated the pictures from the slides into the computer presentation accompanied by text and sounds.

The subjects also commented on the interactivity of their lessons. When asked directly most subjects considered their project lacking in interaction via the computer, even those subjects whose lessons were found to be interactive. Virtually all of the subjects considered their lessons to be interactive because, they planned to call for student participation as they conducted the lesson. This personal interaction with the students was seen by subjects as being important to spark student interest in the material as well as providing an opportunity to collect information on student comprehension. However, students who presented linear lessons did not make the same connection to the information presented via computer. Instead of presenting material in a different order or manner depending on student interaction, these subjects were allowing students to interact with material the teacher had selected in an order the teacher had arranged.

The subjects indicated that their individual teaching style was affected by their interaction with their cooperating teacher. Subjects indicated that they worked to match the teaching style of the teacher, attempting to insert ideas of their own whenever possible. Those subjects who taught at the middle school level reported more chances to try new ideas in the classrooms. The subjects who taught at the high school level reported more pressure to cover material, “We just had so much to cover that there wasn’t time for different ideas.” Some subjects at the high school level taught a one-semester course. In these courses, the first teacher with whom the students interacted with was the intern. Nevertheless, these students also reported that they were encouraged to conform to the ideas of their cooperating teachers classroom and stress coverage of material at the expense of depth.

Finally, subjects reported that their individual computer use was affected by their interaction with the cooperating teacher. The exceptions to this result came from those subjects who were highly motivated to use the computer. Three subjects reported computer use "in spite of the teacher," as one of the subjects phrased it, rather than because of the teacher. Those subjects associating with teachers classified as significant models discovered new uses for the computer along with support for existing uses. For example, one subject reported that the supervising teacher introduced the class to computer technology for myth writing.

Using a program called Hyperstudio, the students built slides on which to present their myths. This supervising teacher had not previously used the computer technology in class and was learning how to incorporate the computer into the classroom along with the intern. Subjects reported that the current state of teacher expertise with the computer was not a factor. Teacher's willingness to use the computer was the deciding factor. Additionally, the availability of computers and the appropriate projection equipment was vital. Subjects reported cooperating teachers who had the knowledge and motivation to use the computer in the classroom who did not do so simply because the equipment was not available.

Summary

This chapter contained the descriptive statistics for the variables of interest and the data analyses pertinent to the questions of this study. It also included the results of interviews which composed the qualitative component of the study. The conclusions, implications, and recommendations generated by these results will be discussed in Chapter 5.

CHAPTER 5
SUMMARY AND CONCLUSIONS

This concluding chapter contains six sections. The research study is described. Results are reviewed. Conclusions are argued. Implications raised by the conclusions are expressed. Limitations are discussed. Finally, further research questions are posed.

Summary of Research Study

The purpose of this study was to investigate the contextualization choices of preservice teachers when they are given the opportunity to develop lessons utilizing presentation software. Twenty Preservice teachers in the secondary social studies PROTEACH program at the University of Florida were the subjects for this study. Each student was enrolled in a computer class prior to student teaching in which interactive presentation software, specifically Astound, was used to create research projects. The following semester, during the student teaching experience, subjects participated in additional workshops on computer applications in education. This provided them with additional opportunities to practice using Astound. Following student teaching, each preservice teacher was asked to develop an ideal lesson using Astound. The lessons were considered ideal because the subjects could remove the constraints associated with being an intern in another teacher's classroom.

Each episode was coded to indicate the amount of interactivity present. To this end, an interactivity measure (IM) was created. An Interactivity Measure was defined as the total number of possible interactions located within an individual episode using the Astound program. An interaction was defined as an instance when the computer user is given the opportunity to influence the pathway of the presentation.

The subjects were identified according to interactive vs. linear mode of presentation. One group was classified as an interactive group; a second group was classified as a linear group. The subjects were further divided into groups according to the following variables; level of the intern school (middle school or high school), computer use modeled by the supervising teacher (none, slight, or significant), availability of a computer lab at the school site, subject taught during internship (American History, World History, Political Science, or Geography), and whether the subject taught during internship matched the undergraduate major of the subject. A statistical comparison was conducted between the pairs within each factor and the factors in combination with interactivity.

Each lesson was presented to the entire group of subjects. These presentations provided each subject with an opportunity to witness the methods utilized by other subjects and compare them to their own choices. Following the lesson presentation, interviews were conducted with the subjects to provide a foundation for a qualitative view of their development of the lesson. The focus of the questions within these interviews was the interconnection between topic chosen by the student and its adaptability, and accessibility to interactivity. This allows for an inspection of the thought processes of the subjects both before and during the creation of the lesson material. Would the subjects have chosen to develop an interactive lesson if a different topic were selected? This also allows for a view of the qualitative differences available within a specific subject matter.

The research question for this study focused on the exploration of preservice teachers contextualization choices and the impact of the variables associated with student teaching. The focus of the study, therefore, was: (a) to explore if preservice teachers choose to incorporate interactive lessons or linear lessons using presentational software, (b) to explore whether the type of instruction of preservice teachers is influenced by the grade level of their student teaching experience, (c) to explore the influence of the presence or lack of computer modeling by their supervising teacher, (d) to explore the influence of the presence of a computer lab at their student teaching school, (e) to explore the influence of the subject matter the preservice teachers were teaching during their internship, (f) to explore the influence of whether the preservice teachers were teaching subject matter which matched their undergraduate major, and (g) to explore qualitatively the reasons behind the lesson development decisions of the subjects in this study.

Results

Hypothesis 1: There is no difference in all possible pairwise comparisons of interactivity with regard to IM.

The null hypothesis was rejected. Interactive presentations were found to be significantly different from the linear presentations.

> Hypothesis 2: There is no difference in all possible pairwise comparisons of grade level with regard to IM.

The null hypothesis was rejected. Lessons of subjects student teaching at middle schools were found to be significantly different from lessons developed by subjects student teaching at the high schools.

> Hypothesis 3: There is no difference in all possible pairwise comparisons of computer modeling with regard to IM.

The null hypothesis was rejected. Modeling was found to be significantly different from both slight modeling and no modeling.

> Hypothesis 4: There is no difference in all possible pairwise comparisons of computer lab presence with regard to IM.

The null hypothesis was rejected. The presence of a computer lab in the school where a subject was student teaching was found to be significantly different from the lack of a computer lab.

Hypothesis 5: There is no difference in all possible pairwise comparisons of subject taught with regard to IM.

The null hypothesis was rejected. Lessons in Geography were found to be significantly different from both lessons in World History and lessons in American History.

Hypothesis 6: There is no difference in all possible pairwise comparisons of subject matching undergraduate major with regard to IM.

The null hypothesis was rejected. Lessons based on topics not in the undergraduate major of the intern were found to be significantly different from topics which matched the undergraduate major.

Hypothesis 7: There is no difference in all possible pairwise comparisons of the two factors interactivity and grade level with regard to IM.

The null hypothesis was rejected. A significant difference in the interactive group was found between lessons created at middle school and high school settings.

Hypothesis 8: There is no difference in all possible pairwise comparisons of the two factors interactivity and computer modeling with regard to

IM.

The null hypothesis was rejected. Modeling was found to be significantly different from both slight and no modeling at both levels of interactivity.

Hypothesis 9: There is no difference in all possible pairwise comparisons of the two factors interactivity and computer lab presence with regard to IM.

The null hypothesis was rejected. The presence of a computer lab in the school where the intern taught was found to be significantly different from lack of a computer lab at both levels of interactivity.

Hypothesis 10: There is no difference in all possible pairwise comparisons of the two factors interactivity and subject taught with regard to IM.

The null hypothesis was rejected. Lessons in Geography were found to be significantly different from lessons in all other subject areas at the interactive level.

Hypothesis 11: There is no difference in all possible pairwise comparisons of the two factors interactivity and subject taught matches undergraduate major with regard to IM.

The null hypothesis was rejected. A significant difference was found between lessons based on topics which did not match the undergraduate major of an intern and lessons based on topics which matched the undergraduate major.

Conclusions

This study focused on the contextualization choices of preservice teachers when presenting an ideal lesson using presentational software. The choices of these preservice teachers, to pursue a linear course or an interactive course, was impacted upon by the experiences of the intern classroom. The grade level of the internship, the amount of computer modeling of the teacher, the presence of a computer lab for classroom use, the subject being taught, and whether that subject matches the undergraduate major of the preservice teacher, were all shown to have an impact upon the interactivity of the ideal lesson.

Of these factors, three will be discussed because of their immediate relevance to the classroom. The first factor is modeling of computer use. Modeling of any higher order task has been shown to be a necessary requirement for the development of higher order thinking skills (Resnick, 1987a). Learning to apply computer technology in instruction can be seen as an higher order thinking task, therefore modeling should function. This study supported this hypothesis. Only when the supervising teacher actively modeled the use of the computer, when compared to no modeling or slight modeling, was an impact detected in the lesson development of preservice teachers. When the supervising teachers modeled computer use, they were presenting technology to student teachers in an explicit manner. Student teachers could relate to the reasons for using the computer as well as possible benefits. The information was coming from a real life setting. It would be considered ecologically valid by Neisser (1976). Preservice teachers are exposed to the use of technology in a classroom rather than only receiving training in theoretical uses of technology as expressed by a College of Education. The technology is made relevant to the task at hand, which is considered vital by many (Schumk, 1990; Zimmerman, 1989).

The use of the computer by the supervising teacher also presents the opportunity for practice by the preservice teacher, another component identified as needed for success in higher order tasks (Newmann et al., 1984; Resnick, 1987b). Supervising teachers who practice the use of the computer require its use from their interns as well. As indicated by the interviews with the subjects, this use developed as the preservice teachers adapted to the teaching strategies of their supervising teachers.

Additionally, many preservice teachers are afraid of the time investments required for the successful use of computers in the classroom. The modeling behaviors of supervising teachers illustrate to the interns in their classrooms that the effort that is invested will be rewarded. The relevance of the time investment is made explicit to the preservice teachers.

The final aspect of modeling that impacts upon preservice teachers involves the ideas of Vygotsky (1962). For many preservice teachers, computer use can be beyond their ability when they enter the intern classroom. When the teacher models computer use and provides opportunities for practice, preservice teachers are given the chance to expand their abilities by working in their proximal zone regarding computer use in the classroom. The supervising teacher and preservice teacher establish a cooperative atmosphere regarding computer use in the classroom, which has been shown to increase the development and use of effective problem solving strategies (Strommen, 1993). With this practice behind them, these preservice teachers entered the lessons development stage of this study with an advantage over their counterparts who did not have computer usage modeled for them. According to the results of interviews with the subjects who did not have computer use modeled for them, they had to have a substantial amount of self-efficacy concerning computers if they were to develop interactive lessons.

The second factor relevant to the classroom is the subject, Geography. Of the four subjects taught by preservice teachers in this study, geography was found to be significantly different from any other subject in terms of interactivity, while no other subjects were found to be significantly different. Geography was not the undergraduate major of any of the subjects in this study. The computer use developed for the participants came during or prior to the development of most of the academic knowledge used during the internship experience. In contrast, history was the undergraduate major of the majority of the subjects in this study. The computer knowledge developed through the instructional computing course was added and integrated with existing historical knowledge and methodologies. In Geography, since computer usage and academic content were more likely to be integrated, technology was a part of the learning not a separate entity. Resnick (1987a) indicated that this connection between algorithms and academic content are vital to successful higher order thinking. Preservice teachers in geography were more familiar with the use of the computer for geographical activities when compared to historical activities. The same comparison can be also made for those with political science undergraduate degrees who go on to teach geography.

During interviews, the subjects who presented lessons in geography indicated they thought geography was more conducive to interactivity because of the type of material that was presented in the topics. Maps, graphs, and cultural material were associated with geography, but not with history or political science. Maps especially were seen by the subjects as being "very clickable," or conducive to student-teacher interactivity. Although maps are used extensively in history, this connection between maps and interactive presentations was not made for historical content. However, the subjects did indicate that they had to search out knowledge in Geography since they did not have as much background material as they would have had were they teaching a history class.

Preservice teachers, presenting a lesson in a subject in which they have established methodologies, are more likely to follow the manner in which they were taught (Haipt, 1994) and lecture to the students in their class from preexisting knowledge. Preservice teachers who developed knowledge of computer use prior to or concurrently with subject knowledge are more likely to involve the students in the quest for knowledge by providing an interactive environment. These teachers would be leading their students to knowledge rather than giving them knowledge, following Poole's (1995) idea of educere. The preservice teachers use of technology would provide further practice that can lead to further use when they get their own classroom.

The final factor with implications for the classroom is the differences in grade level. Middle school settings were more likely to produce a preservice teacher who would establish an interactive context in the classroom, when compared to high school settings. The difference between middle and high school settings was also found within the interactive group, with the mean interactivity measure of middle school placements being significantly greater than the mean interactivity measure for high school settings inside the group identified as interactive. The explanations for this occurrence are centered in the environments of the schools. The middle schools within which the preservice teachers operated all use a team strategy. A cross-subject group of teachers are responsible for a specified group of students. This team teaching atmosphere provides an environment which is flexible when dealing with new ideas and teaching styles. If the teachers on the team can be shown the reason for use a new idea and can be given successful examples, they are more likely to utilize the ideas in their classroom (Johnson, & Harlow, 1993).

The supervising teachers in these settings are more likely to allow preservice teachers to try different methods in their classrooms when compared to teachers in an individual environment. The subject interviews demonstrated this idea. Those subjects who functioned under a teacher in a team atmosphere, indicated that they were free to insert new ideas and methods into the classroom. They were given examples which indicated that alternate viewpoints were allowed, which has been shown to spark discussion and higher order thinking (Miller, 1990). The multiple representations expressed by cognitive flexibility can be attached easily to such atmospheres. The teacher would be free to approach a topic from multiple perspectives instead of only the perspective of the textbook. These teachers would be more likely to utilize technology.

Additionally, preservice teachers entered the middle school with information which they have gathered during collegiate experiences. While this information can often be presented as collected to high school students, the material will have to be transformed for use at the middle school level. This transformation provides an opportunity to revisit information with a technological emphasis. Just as new subject material learned along with technological knowledge provides an opportunity to utilized technology, as with Geography, this notion can be transferred to material which has to be transformed for a different audience as well.

Technology can provide students with the opportunity to interact with information in multiple contexts which will help to prepare them to develop knowledge, and the ability to activate that knowledge, in different ways and situations than they had experienced before (Jacobson, & Spiro, 1995). The students would be able to activate knowledge in their own manner and time, as opposed to the manner and method dictated by the teacher in a linear presentation. This clearly implies a pedagogy different from the conventional.

If higher order thinking is not accomplished by the preservice teacher, it can not be expected from their lessons. Those subjects that indicated that they had to teach the teachers way and no other way, were from individual atmospheres or single structure departments with an authoritative leader. These subjects indicated that if they used technology at all, it was in spite of the supervising teacher and not because of the teacher. Similarly, subjects in this type of classroom used technology mainly outside of the classroom. This use would take the form of word processing, overhead creation, and grade book programs. Any presentations to the class needed to function within the linear context established by the supervising teacher.

The three factors combine to demonstrate the utility of interactive technology in the classroom. When the preservice teacher makes the decision to develop an interactive lesson, the classroom context that results presents an atmosphere where discourse is not only accepted, it is required. Discourse is this type of classroom would follow the definition expressed by Habermas (1992) of an Ideal Speech Situation. Each member of the classroom would be given the opportunity to participate in the academic discourse associated with learning. Students would be active participants in knowledge creation, which has been shown to be a necessary ingredient for a higher order thinking classroom (NCSS, 1994; Newmann, 1991b). Students would also be given the opportunity to develop their own questions and problems, rather then following through teacher lead recitation. This type of classroom would follow the suggestions of Eulie (1984) who indicated that the Social Studies should be seen as a series of questions and problems for students to solve. This type of Social Studies class would have meaning for students who would then be able to develop the attachment that is needed for academic success (Wehlage, et al., 1989).

The interactive classroom can then be compared to the classroom context established by a linear presentation. The teacher leads the class to information identified previously for student development. All information proceeds to and from the teacher, questions, answers, and problems for the most part are generated by the teacher. This type of classroom contradicts the notions of the construction of meaning developed through educational research. The students are not active, as they would be in an interactive lesson. The knowledge is given to the students instead of the students developing their own knowledge. Numerous researchers have demonstrated that this type of learning style will not benefit most students (Delpit, 1992; Egan, 1992; Newmann, 1991b; Poole, 1995; Resnick, 1987a).

It is impossible for the teacher to establish a classroom where each learning style of each student is being serviced at every moment. The successful teacher, however, needs to present lessons which are tailored to the individual learning styles of students (Kaha, 1995; Stahl, 1994). An interactive environment allows the teacher the flexibility to present information from various perspectives that can reach the strengths of students who are not able to successfully access information in a traditional linear lecture (Spiro, & Jehng, 1990). Additionally, an interactive classroom presents the teacher with the opportunity to coach performances of students at regular intervals outside of testing situations. This type of academic coaching has been show to promote student achievement (Collins et al., 1989) and could be used to provide proximal zone tasks for students (Vygotsky, 1962). These proximal tasks also provide a chance for students to develop their ability to recognize opportunities to utilize their knowledge. Interactive lessons can provide students with information from multiple perspectives which can be more easily transferred to other contexts (Spiro et al., 1992). Knowledge transfer has been identified as a need area in education (Gardner, 1991; Resnick, 1987b) In this manner, students are able to develop knowledge that can be transferred to various situations both in-school and out, instead of merely developing answers to an exam.

Implications

This study has definite implications for teacher education, school systems, and classroom teachers. These areas will be discussed in turn.

The findings of this study suggest that teacher education programs should take technology into consideration when developing field experiences for student teachers. The first field experiences for secondary social studies should be at the middle school level, whenever possible. This experience provides the first glimpse at the school from the perspective of a teacher rather than a student. The results of this study indicate that the middle school level would provide an appropriate venue for this first experience in that a flexible environment is present in which the student teacher will need to transform their knowledge to a lower level than the collegiate course. Additionally, many teacher education programs start field experiences as early as the freshman year of college.

Most students would be comparing the high school they visit with the one they recently left. A middle school placement would provide an experience which would force the student teacher to compare classrooms that are not as fresh in memory and therefore less likely prejudiced.

Teacher education programs will need to place student teachers at both the high school and middle school level in later placements. In these placements, other concerns become apparent from results of this study. This study indicated the strength that significant computer modeling has on the computer use of preservice teachers. This result is consistent with the notion that interns be placed with teachers who have been identified as being able to model computer use significantly, whenever possible. The pairing of intern and modeling supervising teacher will provide the preservice teacher with experience, coaching, and practice in the classroom use of computer technology which can be beneficial in the development of the classroom of the preservice teacher during internship and beyond. Over the course of successive years, the pool of teachers who can and will model the use of the computer will grow as the graduates of the teacher education programs enter the classroom and become supervising teachers themselves.

Additionally, teacher education programs need to introduce the use of technology early in the program. This would allow computer knowledge to be developed concurrently with content knowledge. Further, the use of technology needs to be a part of methods courses and not simply an additionally technology course. The use of the computer must be a part of the teaching techniques presented by the program if preservice teachers can be expected to incorporate its use in the classroom.

Teacher education programs must also reach out to the entire educational community. By establishing themselves as a resource center, teacher education programs provide teachers, both preservice and in-service, with information and materials which can enhance teaching in general and the use of technology in particular. Reform movements are continually calling for better communication between school systems and universities (NCSS, 1994). When teacher education programs establish themselves as a clearinghouse for materials and information, schools in general and teachers in particular will be able to see the relevance for the classroom. When teachers can see relevance in associating with teacher education programs, they will be more likely to participate as supervising teachers, co-researchers on projects, and other possible collaborations.

The results from this study also indicate some suggestions for school systems as well. School systems need to provide the resources to enable all desiring teachers to use technology in the classroom, especially at the high school level. This change will require schools to recognize the time investment that will be needed in order for teachers to develop the use of technology in the classroom. Planning time has been identified as a major need for the implementation of computers in schools (Butler, & Clouse, 1994). Too often, school systems equate time investments as in-service workshops and training opportunity. While the training is a necessary component, teachers also need time to develop lessons during the school year. Planning periods and development time must be made available if teachers are to incorporate technology in their classrooms.

Besides the time investment, schools will need to recognize that the use of technology is not subject specific. Too often, the use of technology is identified with a few subjects like mathematics and the sciences. This study focused on social studies. A subject can and will be able to functionally use technology if the the proper investments of time and equipment are made.

Schools will also have to recognize that they are investing in teachers and not in specific technology. Teacher input into technology purchases, both hardware and software, has to be considered a necessity. Teacher input in technology should be at least the equivalent of the input into textbook purchases for classroom use. Any text that is used in the classroom first should be used by the teacher. If a text which the teacher does not like is forced on a classroom, the likelihood that the text will be used successfully will be greatly reduced. In this instance, technology should be considered as another form of text to be used in the classroom.

Classroom teachers must recognize that an interactive presentation is another tool that can be used in the classroom. Another method to be added to the arsenal of learning which might reach students who are not serviced effectively by other methods. Classroom teachers need to see that the initial effort that will be required will be rewarded. Too often, new ideas are judged by their quick returns. Teachers ask if this idea would help me, the teacher, save time. Computer technology, in terms of interactive presentations, is not a time saver at first. It is an investment. The effort and short term losses in earlier periods will project into dividends at a later date.

This study also provides further illustration of the dangers of a teacher choosing to focus academic attention on the amount of material to be covered instead of focusing on covering topics in depth. Newmann (1991b) suggested that an emphasis on coverage over depth can prevent the establishment and maintenance of a thoughtful classroom. Gardner (1991) suggested that an emphasis of coverage over depth can prevent teaching for understanding. This study builds on the path developed by these studies. An emphasis of coverage over depth can prevent a teacher from being able to recognize the utility of developing interactive lessons for students. An interactive classroom which fits the definition of an ideal speech situation developed by Habermas (1984) would require an significant investment of time and energy. The pace of lesson presentation impacts upon the ability of higher order activities being presented and functioning towards understanding as a goal. These ideas have been shown by this study to be targets of an interactive classroom As with lesson planning and other classroom strategies, the use of computer technology will be made easier with practice.

A scenario suggested by this idea for a social studies classrooms use of interactive presentations would follow this progression. The teacher develops a lesson presentation utilizing a software program, for example Astound. The lesson is presented to the students with interaction possibilities. The students can affect the order of presentation providing illustrations and multiple points of view. For example, a lesson presenting the causes of World War I could present the views of militarism, nationalism, and the alliance system from persons of different countries, Great Britain, Germany, United States, and France for example. This presentation will enable students to develop connections with the material that would not be available in a linear presentation. The students can develop a sense of ownership over the material.

After the lesson, the presentation is made available in the school's computer lab so that students can access the information at anytime and in any order they desire. This access would be especially helpful during reviews for assignments, tests, or exams. Additionally, the presentation is made available on the school's World Wide Web page on the internet. Students can access the material from home via modem, if they have the proper equipment. This would allow some students to access the material from outside school, opening up lab space for students who do not have their own computers.

This type of presentation will allow students to access the information contained in the lesson at numerous intervals at their own pace. The students would be led to the knowledge, following the idea of educere, and actively pursue understanding as opposed to listening to a lecture on the causes of World War I and reading a textbook. This activity would fit most descriptions of higher order thinking.

Limitations

For every answer this study provided, several questions became apparent. Future research in this area should first attempt to eliminate the limitations of the current project. These limitations include sample selection and the computer backgrounds of the subject group.

For the purposes of this study, the sample was limited to social studies preservice teachers, enrolled in the secondary social studies PROTEACH program at the University of Florida. This sample of convenience should be expanded in future studies. The increased sample size will add power and validity to the results of the study.

There are two ways in which this increase could be accomplished. First, expand the sample population outside a particular university or city. A future study could include subjects from a number of institutions as long as the programs utilized by the institutions did not differ significantly. If another program could be found, other subject areas could be included in the study.

This study focused on the responses of social studies preservice teachers. There is no logical reason to prevent the inclusion of other subject areas as well. The comparison of the subject areas would provide insight into the uses of technology in different disciplines.

The second limitation of the current study involved the computer background of the subjects, which could vary. There are a number of ways this limitation could be corrected in future studies. First, a measure could be administered prior to the start of the computer class. This measure could provide a possible covariate for the study which would address this limitation. If the covariate could be shown to be correlated to the dependent variable, an analysis of covariance (ANCOVA) could be conducted. A suitable covariate could not be found for this study. Using an ANCOVA, the power of the study would be markedly increased.

Second, if the covariate were not found to be a solution, the pretest could be used as another factor for an analysis of variance (ANOVA) comparison. While not having the power of ANCOVA, the factorial ANOVA that would be developed with this new measure could have more power than the original study.

Finally, all subjects could be required to participate in the same prerequisite courses prior to the commencement of the study. Currently, all subjects only completed one course together, this correction would establish a series of courses for the subjects. This series would ensure that all subjects would be exposed to similar material, if not have the exact same preparation in computer use.

Questions for Future Research

Other research questions suggested by this study go beyond correcting the limitations inherent in the study. These questions call for the expansion of the study into contiguous areas in research. The first area would be a study concerning the impact of interactive presentations on the achievement of students in classes. These studies could be in a particular subject or become a comparison of subjects. Studies in student achievement could also be expanded to include comparisons of achievement on standardized tests. These tests could include both national and state required tests or measurements of specific abilities such as cognitive reasoning.

Another area that questions from this study raise for consideration include the study the impact of modeling of computer use by the supervising teacher during internship on the use of computer technology by the intern during the initial years of classroom teaching. Will the gains initiated by the computer modeling be sustained? If not, what factors impact upon its continuation? Additionally, a case study in this area could look at reception in schools towards new teachers with a background in technology. Will the schools act out the responses described by Papert (1993)?

Teacher education programs will also need to be studied. The impact of teacher education programs which combine technology along with teaching methods need to be compared with teacher education programs which teach technology separate from teaching methods by looking at the technology use of interns and first year teachers who matriculate from the programs.

Finally, a question raised by this study would be a comparison of classrooms which utilize interactive presentations with classrooms which utilize other forms of technology. This comparison of methods can illustrate the differences, if any, of the two methods on student achievement, teacher use of technology, or classroom management.

Summary

This study illustrates the connections between the contextualization choices of preservice teachers and the environment within which they encounter practical experiences. The rationale for the study was based upon research related to contextualization, research related to the construction of meaning, research related to the educational uses of technology, and research related to teacher education. The subjects received a similar background in computer technology for the classroom and had the opportunity prior to student teaching to utilize interactive presentational software. However, their experiences during internship impacted upon the contextualization choices they made after their internship was completed. During interviews after lesson completion, the subjects indicated that they had found themselves adjusting to the teaching style of the supervising teacher. This change in style could be applied to contextualization choices as well.

Three major areas of the practical experiences are highlighted by the results of this study. First, computer modeling on the part of the supervising teacher. When the teacher models the use of the computer significantly, there is a statistical difference between the interactivity of the lessons created by preservice teachers when compared to those preservice teachers whose supervisors either did not model or only slightly modeled computer use. The modeling of computer use provides an illustration to the preservice teacher of the value of modeling all higher order thinking tasks for students.

The second area concerns the location of the practical experience. Those preservice teachers who conducted their internships in a middle school were found to create more interactive presentations than those from high school settings. During the interviews, more subjects at the middle school level reported an open environment for experimentation and change when compared to the high school. This flexibility can account for the differences in interactivity at grade levels. The high school subjects reported that they were locked into a course of study that required them to rapidly progress through material. This amount of coverage did not allow for a change in teaching style from that of the supervising teacher.

Finally, Geography was found to be a subject that produced more interactive lessons than any other subject. The fact that Geography was not a subject that most of the preservice teachers had experience in prior to entering the teacher education program is hypothesized as one explanation of the difference in subject matter. Additionally, the material in geography, the maps, charts, and other instruments were identified by subjects as one possible reason for its comparative ease of interactivity.

All three factors point to the important part interactive lessons can play in the classroom. Interactive lessons allow students to be active participants in lessons as well as in the development of their knowledge. Research into the construction of meaning illustrates the importance of higher order thinking in the classroom. Technology gives one illustration of a method for teachers to accomplish higher order tasks. Finally, teacher education programs are identified as the starting point for technological training. Teacher education programs must not only preach the importance of technology, they must practice it as well.

APPENDIX A
CONSENT FORM

Investigator: D. Mark Meyers Doctoral Candidate University of Florida

Description of the study:

The subjects in this study will consist of the secondary social studies proteach cohort group for 1995-1996. Each of subjects will have completed a course in instructional computing, as well as a student teaching assignment before the start of the study. In addition, the subjects will be given the opportunity for guided practice with the computer equipment during the student teaching experience. During the study, the subjects will develop lessons utilizing the presentational software program Astound. The lessons will be ideal lessons developed from the student teaching experience. These lessons will be "ideal" in that all constraints of the student teaching environment will be removed. At no time, during the development of the lessons, will the data collected for the research study have any impact upon the grades of the subjects in any class.

Following the development of the lessons, the subjects will be interviewed by the investigator. The purpose of these interviews is to develop background information in order to better understand the thought processes that went into lesson development. Again, at no time will the interviews be used to determine grades in any course. *During the interview, you do not have to answer any questions you do not wish to answer.*

If you have any questions or concern, please feel free to contact me, at 258 Norman Hall or 392-0761 Ext. 281.

I have read and understood the procedures described above. I agree to participate in the procedure and I have received a copy of this description.

Subject: ______________________________ Date: ____________

Investigator: ______________________________ Date: ____________

Approved by the University of Florida Institutional Review Board for use through February 21, 1997.

APPENDIX B
TABLE OF C VALUES FOR SHAFFER-HOLM PROCEDURE

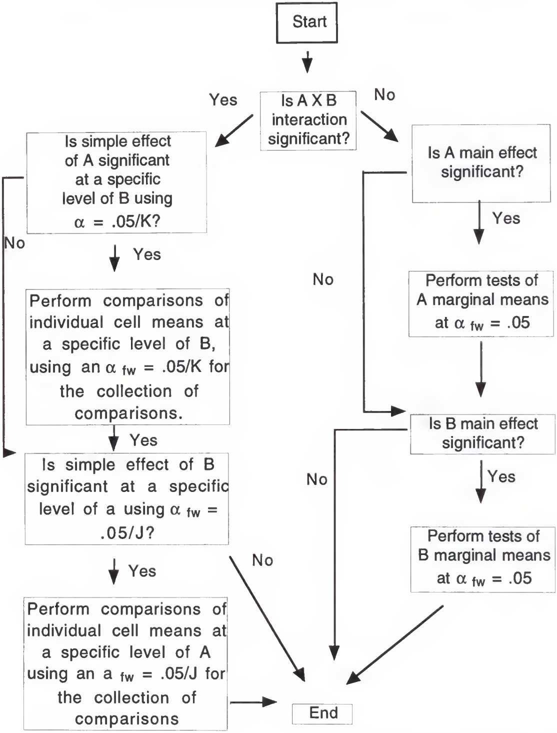
	J or K			
Stage	3	4	5	6
1	1	3	6	10
2	1	3	6	10
3	1	3	6	10
4		3	6	10
5		2	6	10
6		1	4	10
7			4	7
8			3	7
9			2	7
10			1	6
11				4
12				4
13				3
14				2
15				1

Note. The Bonferroni critical value $\pm\ t_{\alpha/2,\ 1,\ df}$ is equal to Student's critical value $\pm\ t_{\alpha/2,\ 1,\ df}$.

Adapted from Algina, 1996

APPENDIX C

GUIDELINES FOR TWO FACTOR PAIRWISE COMPARISONS


Start
Is A X B interaction significant?
Yes
No
Is simple effect of A significant at a specific level of B using $\alpha = .05/K$?
Is A main effect significant?
Yes
No
Yes
Perform tests of A marginal means at $\alpha_{fw} = .05$
No
Perform comparisons of individual cell means at a specific level of B, using an $\alpha_{fw} = .05/K$ for the collection of comparisons.
Yes
Is B main effect significant?
Is simple effect of B significant at a specific level of a using $\alpha_{fw} = .05/J$?
No
Yes
Perform tests of B marginal means at $\alpha_{fw} = .05$
Yes
No
Perform comparisons of individual cell means at a specific level of A using an a $_{fw}$ = .05/J for the collection of comparisons
End

Adapted from Algina, 1996

APPENDIX D
INTERVIEW QUESTIONS

1. Biographical Data:

    Name:

    Undergraduate major:

    Location of Student teaching:

    Supervising Teacher:

    Subjects Taught:

2. How did you select the topic for your lessons?

3. Was there another topic you considered but did not select?

4. Did you have a course in the topic you chose?

5. When during your student teaching did you cover that topic?

6. Was your decision impacted by the order of topics you presented during internship? (Was the last topic covered chosen?)

7. How would you rate the interactivity of your lesson?

8. Would another topic been easier for you to use interactively?

9. If so, what topic?

10. If you had the assignment to do over again, would you choose the same topic?
11. Did your interactions with your supervising teacher affect your use of the computer?

12. During the course of student teaching, did you find yourself adapting your teaching style to the style of your supervisor or did you find yourself adapting the class to your style?

13. How would you characterize the modeling of computer use by your supervising teacher, none, slight, or significant?

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BIOGRAPHICAL SKETCH

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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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